



*KNOWLEDGE ENHANCEMENT EVENTS:  
AGRICULTURAL WASTE DISPOSAL WORKSHOP  
AFTER ACTION REPORT*

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FEMA REGION VIII HEADQUARTERS

LAKEWOOD, CO

JULY 17, 2012

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# 1.0 Executive Summary

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This After Action Report (AAR) was developed following the Agricultural Waste Disposal Knowledge Enhancement Workshop, which occurred on July 17, 2012 at the Federal Emergency Management Agency (FEMA) Region VIII Headquarters, Longs Peak Classroom, Denver Federal Center, Lakewood, CO. This AAR incorporates information from recorder notes, including questions, comments, recommendations, and includes information from the feedback forms. . The AAR was distributed to the planning team and members from the Wide Area Recovery and Resiliency Program (WARRP) Leadership Team for review and comment prior to final release.

The purpose of the WARRP Agricultural Waste Disposal Workshop was to advance the understanding of agricultural waste disposal following a Foot and Mouth Disease (FMD) outbreak in Weld County, CO; identify issues significant to agricultural carcass disposal; and obtain feedback on current agricultural waste disposal tools. There were approximately fifty people in attendance representing local, regional, state and federal emergency management officials, the Department of Homeland Security (DHS), FEMA, the Environmental Protection Agency (EPA), United States Department of Agriculture (USDA), Colorado Division of Public Health and the Environment (CDPHE), private sector and academia.

Lori Miller, DHS WARRP Program Manager and Dr. Keith Roehr, State Veterinarian of Colorado opened the event by thanking state and local partners for attending this workshop. Both stated their goals for attending the event was to learn from the locals and take that information back to better develop current tools and technologies.

The workshop started with a symposium comprised of speakers from Colorado State University, Colorado Department of Agriculture, USDA, DHS, CDPHE, EPA, and Texas A&M University.

The Knowledge Enhancement Working Group (KEWG) participants had the opportunity to practice using three of the key agricultural waste disposal tools available today. Through a facilitated breakout session, they practiced reviewing and using the following tools: Disposal Options Matrix, Disposal Decision Tree, and Disposal Options Checklist. The acronym for these tools is MaTCh or Matrix, Tree, Checklist. Participants acknowledged the need for future workshops and practice sessions as they just touched the surface of this potential threat. They were given a small-scale scenario to work through and it was daunting for most. The results of this meeting will be used to further validate or eliminate the need for Agricultural Waste Disposal guidance in the state and region. WARRP is determining where to incorporate findings from this report (e.g., *Denver UASI All-Hazards Regional Recovery Framework* or the *Colorado Department of Agriculture Feedlot Emergency Disease Response Plan*).

*The content of this After Action Report represents the best efforts of the participants based on the information available at the time of publication, but is not intended to convey formal guidance or policy of the federal government or other participating agencies. The views and opinions expressed herein do not necessarily state or reflect those of their respective organizations or the US Government.*

## 2.0 Background

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The Departments of Defense and Homeland Security, in close coordination with the Denver Urban Area Security Initiative (UASI), have partnered to establish the Wide Area Recovery and Resiliency Program (WARRP). The purpose of this collaborative program is to study, develop and demonstrate frameworks, operational capabilities and interagency coordination, enabling a timely return to functionality and re-establishment of socio-economic order and basic services through execution of recovery and resiliency activities, as applicable. This program will explore a coordinated systems approach to the recovery and resiliency of wide urban areas, including meeting public health requirements and restoring all types of critical infrastructure, key resources (both civilian and military) and high traffic areas (transit/transportation facilities) following a chemical, biological or radiological (CBR) incident.

## 3.0 Goal & Objectives

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### *Goal*

The goal of this workshop was to increase knowledge on the key elements related to agricultural disposal in the recovery process following a wide area catastrophic incident in the Weld County, CO agricultural area.

### *Objectives*

- **Increase knowledge** about FMD epidemiology, economic impact, current response strategies, carcass disposal options and current government guidance
- **Provide input** to expand existing FMD wide area recovery guidance through a breakout group structure
  - *Disposal tools:* e.g., Disposal Decision Matrix, Disposal Decision Tree, and Disposal Checklist
  - *Disposal plans:* Colorado Department of Agriculture Feedlot Emergency Response Plan and Draft Denver UASI All Hazards Regional Recovery Framework
- **Develop a long-term plan** for agencies to interact (e.g., continue this working group). Identify the state agency to lead this effort including making policy improvement and clarification of roles/responsibilities
- **Assist in the development of an exportable learning package** by providing feedback on this inaugural training event

## 4.0 Scope & Format

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### *Scope*

The WARRP Agricultural Waste Disposal Workshop, hosted by Department of Homeland Security, was a one day event. It provided an overview of the complexities of animal carcass disposal following a FMD outbreak. Participants received comprehensive read ahead material documenting an artificial scenario which was used



throughout the workshop. At the workshop they learned about the epidemiology of FMD, understood the latest developments in animal carcass disposal, practiced with the tools, and learned about the latest plan guidance. Most importantly, participants were able to expand their professional network as participants from other states and agricultural offices attended this workshop.

### ***Format***

This was a one day workshop. For additional information on format, see [Annex A – Agenda](#). Participants from various organizations attended and are listed in [Annex B – Participants](#). Feedback was captured using a standard feedback form and a summary of workshop findings are found in [Annex C – Participant Feedback](#). For information on the planning team, or to get more information on this after action report, see [Annex D – Key Points of Contact](#).

This event did not use the standard WARRP scenarios to base workshop content but rather created a custom scenario. It is contained in [Annex E – Read Ahead Material](#).

Acronyms may be found in [Annex F – Acronyms](#).

## ***5.0 Discussion***

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### ***Opening Remarks – Review of Workshop Objectives and Agenda***

Stacey Tyler, event coordinator and WARRP Program Integrator, opened the workshop by welcoming participants from state and local agencies. She provided a workshop overview of the objectives and the agenda for the day. Ms. Tyler emphasized the importance of the event because it is a pilot workshop and in addition to informing the *Denver UASI All-Hazards Regional Recovery Framework* and other guidance, the results and outcomes will also shape future agricultural waste disposal events.

Ms. Lori Miller, Department of Homeland Security WARRP Program Manager thanked FEMA Region VIII for their ongoing support of the WARRP program. Lori also recognized the outstanding partnerships that formed throughout the planning for this event including Colorado Department of Agriculture, CDPHE, Colorado Department of Emergency Management (CDEM), Colorado State University, Weld County and Denver Environmental Health. She also recognized the participating federal partners including representation from USDA, EPA, Centers for Disease Control (CDC), and the Department of the Interior (DOI). Ms. Miller also gave special thanks to the industry participants including the National Renderers Association, and Waste Management, Inc. and Texas A&M University. Lori informed participants that their input will be extremely valuable and that the work done in this workshop will improve our ability to respond to a foreign animal disease outbreak not only for the state of Colorado but for the nation.

Next, Ms. Miller welcomed Dr. Keith Roehr, Lead Veterinarian for the State of Colorado. Dr. Roehr stated, “Agriculture is the second largest industry in the state, 70% of the agricultural business is livestock, and 70% of the livestock is beef cattle. Agriculture is a system, it is a continuum and is not something that can be easily protected because it is constantly in motion. The potential for the spread of disease, especially with FMD is very significant.” Dr. Roehr indicated that everyone needs to be engaged in the plan; everyone from the milk producer to the milk processor.

“In the event of an outbreak, everyone in this room would have a role to play. Plans are important, but planning is everything. Different segments of emergency management are not always involved of an emergency. However, if you eat, you are involved in agriculture. Things that are threats to agriculture, impact everyone,” stated Dr. Roehr.

Mr. Garry Briese, local WARRP Program Integrator, provided a brief overview of the WARRP program. Garry described how the program originated in Seattle with the Interagency Biological Restoration Demonstration (IBRD) and a scenario that was anthrax specific. It evolved into an all-hazards recovery focus with emphasis on chemical, biological, and radiological attacks. It was discovered during the program that a very important fourth focus area should be added; hence, the topic of this workshop – Foot and Mouth Disease (FMD). Garry stated, “this program becomes a demonstration for the entire nation. This is a contribution to our nation’s security, thank you for your participation today.”

### *Dr. Dave Van Metre - Foot and Mouth Disease: characteristics and epidemiology*

Dr. Dave Van Metre provided a comprehensive review of the disease agent included what symptoms the disease causes, and the host species. Salient features of the epidemiology of the disease include impacts to the hoof stock with an even number of toes, including cattle, swine, sheep, goats and water buffalo. This disease does not affect horses; it is a mild and uncommon zoonosis. The virus is small, yet extraordinarily diverse. FMD is characterized into seven “families” and within each family there is a multitude of strains. Bone marrow and lymphatic tissue can harbor the agent longer than the edible tissue. FMD can spread through direct contact between an infected and un-infected animal, as well as through transportation methods which is a major concern. The morbidity (illness) rate is very high, although mortality rate is very low 1-2%. One factor contributing to this is the euthanasia of infected animals. It is significant to note that animals can shed the virus before they show signs of disease. Immunization is not an effective solution because there are too many strains, and vaccinated animals can still carry and shed the virus. In addition, vaccines only protect against a single strain of virus and there are numerous strains. Another major factor to consider since most beef cattle have black hair it is difficult to diagnose FMD by looking for the characteristic symptom of red hooves.

Pigs are considered an “amplifying host” because they can aerosolize the agent. Sheep are important for the spread of the virus; yet, when they show symptoms it is very subtle.

Because it is an epithelial infection, lesions heal quickly, usually within two weeks. However, a major concern is dehydration. Infected mothers can experience bacterial mastitis thus not caretaking for their young. In summary, FMD is highly contagious and has profound impact on animal health and animal welfare. Infected and vaccinated animals can carry the virus.

One participant had a question below:

Q: I understand that cooking inactivates the virus, do you know at what temperature?

A: It depends on the thickness of the cut of the meat and the curing technique. Pasteurization inactivates the virus at a rather low temperature; 76 degrees Celsius.

Customs and border patrol keep us safe by confiscating meat brought in from different countries. Sausage and meats from different countries can introduce FMD to our food supply.

Accidental incursions have a focal point because a transfer of the virus across international borders. Detection of that will rely optimally on a highly informed veterinary workforce so that the disease can be confirmed. If an infected animal were to gain access to a distribution center (such as an auction barn) the disease can spread quickly because the animals are then transported to other states and even countries.

### *Dr. Nick Striegel – CDA Plans for FMD Response and Recovery*

Dr. Striegel provided an outline of Colorado Department of Agriculture perspective on carcass disposal. He indicated the last outbreak of FMD in the United States was in 1929. He pondered the question, “What will our response look like to the next outbreak?” Dr. Striegel stated, “hopefully it will not look like the UK’s 2001 response.” The United States is extremely vulnerable to FMD because of the movement of livestock, and their immune susceptibility to the disease. Having an FMD outbreak will have a significant impact on the United States both economically and psychologically.

***Lori Miller provided a statistic – In the South Korean FMD outbreak in 2011, \$1.25 million dollars an hour was spent responding to the outbreak. Note: South Korea is the size of Indiana.***

Colorado’s response activities are organized by Colorado Rapid Response for Agriculture and Livestock (CORRAL).

- Communication capability: Using a dispatch system for alerts, warnings, and notifications;
- Operations center: Enhancing the Livestock Division Operation Center;
- Resources: Building a roster of CORRAL responders and physical resources;
- Relationships: Strengthening relationships with other state and governmental agencies;
- Agreements: Developing mutual agreements between agencies and other states; and
- Livestock emergency plans: Sector-specific plans integrated with Colorado's livestock

Dr. Striegel noted how important relationships are and that doing this workshop provides opportunities for making contacts in various agencies. He discussed the Memorandum of Understanding between CDPHE and Colorado Department of Agriculture (CDA) and with Colorado and Nebraska. He stated livestock plans are also integrated with industry, and sector specific plans have been vetted with the various segments of industry.

In the event of a FMD Outbreak, he stated that it can be detected by either a producer, processor or local veterinarian. Because it is a reportable disease, the State Veterinarian would be notified immediately and a FADD (Foreign Animal Disease Diagnostician) would be dispatched to investigate. At that point, it would be determined how the sample would be submitted to the Plum Island Laboratory in New York for confirmation. Response actions would be dependent on what disease is diagnosed. If it was FMD, state and federal plans would go into play. First actions would be to stop livestock movement and increase surveillance. Additionally, it would involve swift depopulation and carcass disposal. Dr. Striegel indicated “recovery is circular, as soon as there is a response, recovery would also begin because of business continuity.”

He also discussed some of the Livestock Movement Restrictions in Colorado. The commission of agriculture has authority to stop movement of livestock and their products. Currently, there is coordination and collaboration between Colorado and Kansas to establish an interstate agreement on livestock movement in the event of a disease outbreak. This is especially important because after 30 days, 40 states could be infected.

No matter if it is a single or regional outbreak, there will need to be carcass disposal.

After a control zone is established, there is still need for the food supply to be maintained. How do products get moved in the face of the FMD outbreak? That is the purpose of the plans.

Dr. Striegel stated there are vaccines in the North American FMD vaccine stockpile; a partnership between the U.S., Mexico, and Canada. However, due to the number of FMD strains, vaccines should not be the only solution. When vaccine is used, a country's vaccine free-status is revoked and meat will be under export restrictions. It is important to keep in mind that this type of scenario affects more than just the livestock industry and vaccination strategies and operations will not eliminate the need for carcass disposal. There is a lot of vulnerability in the United States due to our large-scale farming practices, however we have the best veterinary infrastructure in the world. We will try to achieve a normal state in the event of an FMD infection as quickly as possible.

In FMD recovery efforts, "response begins at the beginning." There are concerns of the delicate balance as to what is the best decision to make. Two things could happen – the industry can be eradicated if the disposal approach is too aggressive and stringent or the disease could spread if a too negligent approach is employed and the disease is not properly controlled.

#### *Dr. Jim Williams – USDA Response to FMD*

Dr. Jim Williams explained the United States import and export value compared with Mexico and Canada. If we had an FMD outbreak, some things would happen regardless of our response. The consequences would be significant to interstate commerce and international trade in livestock would be completely halted or greatly damaged. In addition, commodity prices would fall. Not only would meat and dairy products be impacted, but it would include the feed grains, such as corn and soybeans. This would occur regardless of whether or not they were infected with FMD; there would be significant economic hardship to the agricultural producers in rural counties. In respect to international trade, there is no distinction. If there is FMD in Colorado, the entire United States is considered infected. USDA response strategies also align with State strategies. The first strategy is always stamping out; however, if at any point in the response it becomes apparent that stamping out will not achieve control (containment and eradication) FMD, alternative strategies will be immediately considered. Dr. Williams discussed the Unified Command (UC) structure for the Colorado Department of Agriculture and USDA/Animal and Plant Health Inspection Service (APHIS). Any FMD outbreak response within the U.S. will automatically be considered a high priority and receive the fullest support possible from all levels of USDA. Other available USDA APHIS personnel will be deployed to a Colorado FMD incident as requested.

#### *Lori Miller – USDA/Homeland Security Headquarters Perspective*

Ms. Miller reiterated the themes from the earlier presentations; such as the international trade implications for just one FMD case within the U.S. It could be days before a FMD case is confirmed, meaning there could already be FMD around the country before we even knew it was present. Current stamping out strategies

can be devastating, based on the experiences from the United Kingdom (UK) and South Korea. The smoke from the UK pyres caused billowing smoke that required the evacuation of neighboring villages. Mass unlined burial resulted in significant ground-water contamination and the effects are still being experienced today.

Rendering, as a disposal option, is the safest process because it is a contained disposal option, i.e., no human health exposures and it inactivates the FMD virus by cooking it.

Ms. Miller emphasized the magnitude of the disposal challenge by illustrating the amounts of several hundred/thousand FMD infected cattle. She shared an example where the waste amount from one feedlot could be equivalent to the weight of the titanic when it sank.

### *Eric Jacobs – Hazardous Materials and Waste Management Division’s (HMWMD) Role Regarding the Storage, Treatment, or Disposal of Livestock Mortalities During an All Hazards Event*

Mr. Eric Jacobs explained the Memorandum of Understanding between CDA and CDPHE signed on June 7, 2011. Eric stated, “CDPHE agrees that agricultural wastes resulting from an all hazards event shall be exempted from regulatory oversight.” They will provide waivers to allow for composters to accept carcasses in an all hazards event. Mr. Jacobs indicated his agency helps identify requirements for approved pathogen destruction for composting and helps establish requirements for permitted sites. Because landfills are privately owned, they have the right of refusal. However, they are an ideal disposal option because some have liners and leachate collection and environmental monitoring systems. Mr. Jacobs also discussed the routine compost testing requirements employed.

### *Dr. Paul Lemieux – Food Safety Modernization Act*

Dr. Lemieux shared the importance of taking an all-hazards approach in order to be prepared to a variety of emergencies and be able to respond appropriately. There are a lot of common activities that DHS is trying to encapsulate into the overall plans, by adding them as annexes. The Denver UASI All-Hazards Regional Recovery Framework with CBR annexes is an example of this. Dr. Lemieux discussed the next steps for the interagency workgroup such as the identification of gaps in guidance and standards. Part of the interagency group is looking at the Food Safety Modernization Act or FSMA. FSMA tasks the EPA with leading the decontamination and disposal efforts associated with recovery. This new statute demonstrates the following areas: development of standards, development of model plans, exercises, modifications, and prioritization.

Dr. Lemieux stated that other plans and policy guidance are targeted for a review including:

1. Foreign Animal Disease Preparedness and Response Plans (FAD PreP) (APHIS)
2. Federal Food and Agriculture Decontamination and Disposal Roles and Responsibilities (Health and Human Services [HHS], USDA, EPA, DHS, DOD)
3. Guidelines for the Disposal of Intentionally Adulterated Food Products and the Decontamination of Food Processing Facilities (Food Safety and Inspection Service [FSIS])
4. Draft Planning Guidance for Recovery Following Biological Incidents (DHS, EPA)

## 5. Draft Planning Guidance and Protection Action Guides for Radiological Incidents (EPA)

Next steps include: 1) identification of gaps in guidance, standards, protocols and model plans and enable prioritization of needs, 2) work to adapt new and existing guidance for applicability to priority food and agriculture scenarios, 3) coordination on priority gaps to inform research needs, 4) enhance collaboration with state and local, environmental and agriculture communities to develop of useful resources, and 5) planning of food and agriculture exercises (decontamination and disposal) as needed to help address priority issues.

### *Dr. Bruce McCarl – Economic Impacts of FMD in Response and Recovery*

Dr. McCarl provided an overview of historical data on disposal loads of disease outbreaks, specifically the UK outbreak, which led to the disposal of 6.6 million carcasses. Disposal decisions can have costly ripple effects such as extensive media coverage of the mass slaughter; this hurt tourism. The loss to tourism exceeded the agricultural costs. Dr. McCarl explained outcomes of experiments in California and Texas involving vaccination. Third, he introduced the concept of welfare slaughter – depopulation of healthy animals due to inhumane conditions or the potential for inhumane conditions. In these big events, roughly a third of the animals were killed because they ran out of feed or space; 2.5 million animals were depopulated for welfare reasons during the 2001 UK FMD outbreak. The estimated cost in Texas High Plains determined that the feed cost was less than the cost of welfare slaughter. Dr. McCarl illustrated the magnitude of the carcass disposal problem, sharing how the problem would be 9 cows wide and stretch the length from San Antonio to Los Angeles.

In Dr. McCarl's analysis, he explained composting burial is the most feasible way to dispose of carcasses when large amounts of carcasses are involved. In this assessment, he shared the tool developed to show an index based vulnerability ranking method determining the suitability of burying carcasses. The economic studies found that vaccination or strategies that reduce carcass flow can reduce disposal cost by as much as 15% in a case study. Carcass disposal concerns turn vaccination in cases from being an undesirable strategy, to a desirable one. Dr. McCarl stated, "if we can salvage some animals for lower valued use (i.e., dog food) it greatly reduces costs." It is best to get to immediate recovery due to the cost considerations involved. Immediate repopulation appears beneficial for both dairies and cow/calf operations compared to staggered repopulation. Business interruption costs exceed the value of property damage in cow/calf and dairy operations. Dairy operations are particularly vulnerable because milk losses are not often included in calculations. Dr. McCarl stated the need for an "event sized graduated policy." Recovery also involves compensation policies. There is a need for preplanning or evaluation of burial sites.

### *Panel Discussion - What should be included in Ag Disposal Plans/Policy/Guidance?*

*An interactive Q/A Session for Participants to Provide Feedback to Improve Governmental Policy on Agricultural Disposal*

Garry Briese facilitated a Panel with key industry experts above. Included in the panel were: Lori Miller, Nick Streigel, Bill Benerman, Jim Williams, Eric Jacobs, and Paul Lemieux. Garry and audience members posed several questions and the panel responded as cited below.

Q: What could be a positive impact of FMD outbreak?

A: If we teach people how to recognize it, then there will be some benefits to preparedness. Our trading competitors will gain substantially if we experience an FMD outbreak. Why put effort and time if it will never happen – maybe it won't, but preparedness for FMD will cause more effective and efficient response to other diseases.

Q: What about the Media?

A: Media is very important. You can have the greatest response, but if there is false information or rumors, the livestock industry will suffer. Private industry has developed a crisis communication team and strategy, including a resource to distribute information in the event it is needed. Our adversaries in agriculture might jump on an opportunity to further their agenda; therefore, it is important to counteract misinformation. Side issues in the media will give headaches; messaging about food safety, pet safety (i.e., can my dog be in the area?).

In Wyoming and Idaho, there is a problem called brucellosis within the cattle industry. This disease can be handled, but it will start causing problems in the wild elk population. This can become a political issue in the media and among environmentalists because we cannot kill all of the wild animals that it has infected.

There is a need for advanced public messaging; we need to minimize the number of animals that need to be destroyed. If our international market is shut down, then we have to focus in on our domestic market. It is important that public service messaging focuses on food safety. FMD is less of a concern than other pathogens such as salmonella; this kind of messaging during “peace time” is important.

For policy, it implies that Texas needs to work out zoning strategies due to the wild hog population. It would be nearly impossible to eradicate if it became endemic in the wild.

Guidance document development in conjunction with tMemorandums of Understanding would be helpful in respect to public messaging. This could be a great tool.

There is confusion among consumers regarding the distinction between FMD and Bovine spongiform encephalopathy (BSE). Also, there is confusion and hesitation regarding the consumption of products from vaccinated cattle. Consumers are not informed about agricultural issues and they are not connected to the agriculture industry.

It is important to note that even organic meat comes from animals that have been vaccinated. Public awareness needs to be increased to understand that vaccination is not a bad thing; in order to have healthy animals for consumption; they need to be vaccinated against disease. Humans are vaccinated, pets are vaccinated, as are cattle.

Public messaging is significant – if you google “FMD”, the second result is hand-foot-and-mouth disease which is completely different from agricultural FMD and results in misinformation on the disease.

### *Priscilla Fitzmaurice - Geospatial Considerations in Carcass Disposal*

Ms. Fitzmaurice discussed the geospatial tool that determines suitability of burial sites for small or large scale mortalities based on the livestock emergency disposal regulations of Colorado. She provided an overview of the methodologies and criteria. Many of the parameters are guided by CDPHE best practices, state regulations and recommendations. The Web Soil Survey examines the soil criteria based on environmental



concerns or excavation issues and assigns it a specific rating based on its suitability for the burial of large animals. Each data set is assigned different weights to each factor according to its relative importance. Combining all the datasets determine the most suitable sites for burial. This tool gives a first look at how to determine if a site is suitable for mass burial during an emergency. However, there are other considerations such as accessibility for machinery, infrastructure, underground and overhead utility lines, and if there are alternative methods of disposal such as composting. Ms. Fitzmaurice addressed future possibilities for Geographical Information System (GIS) – the need to create suitability maps for other states according to local/state/federal regulations, best practices and other criteria, and incorporate actual livestock locations for use in emergency response.

Lori Miller - Foot-and-mouth (FMD) Scenario and Demonstration of Disposal Tools

Lori Miller provided an overview of the **MaTCh** (Matrix, Tree, Checklist) tools that the participants would be using in the next segment of the workshop; the breakout session. The Disposal Options Matrix consists of a risk assessment matrix which assigns numerical values to various disposal options based on suitability factors. Some of the factors included public health risk, biosecurity, and cost effectiveness. See Figure A. The Disposal Options Tree shows a linear progression and the steps needed to decide which option to consider. See Figure B: Disposal Decision Tree. The Disposal Options Checklist is a tool with step by step considerations for each option including very detailed factors such as soil type, groundwater concerns, and public concerns. Lori also showed the USDA APHIS on-line learning tools available to all participants which are also contained in the Disposal Options Checklist. See Figure C.

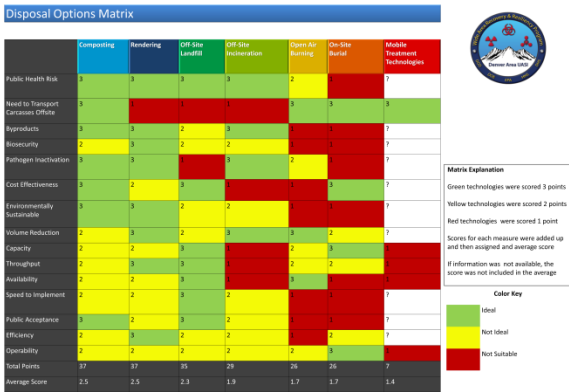


Figure A: Disposal Options Matrix



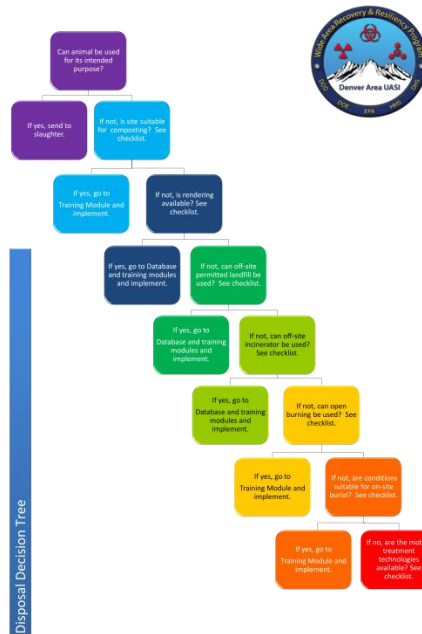


Figure B: Disposal Decision Tree

Figure C: Disposal Options Checklist

## ☐ First Option - Can Animal be used for its intended purpose?

- ☐ One of the first considerations for carcass disposal is legal restrictions. Consultation with federal, state, and local officials is necessary to:
  - ☐ Identify local restrictions on carcass disposal
- ☐ If so, send to slaughter or other processing. **If not,**

## ☐ Second Option - Is site suitable for composting?

- ☐ Based on the expert opinion of a trained and qualified compost specialist, are the site conditions suitable for composting the number of animals affected?
  - ☐ At least 200 feet from water wells, surface water bodies (lakes, streams, rivers, etc.), sinkholes, seasonal seeps or other landscape features that indicate the area is hydrologically sensitive.
  - ☐ Adequate land area to build compost piles
  - ☐ Located away from neighbors and/or out of sight.
  - ☐ Located downward from neighbors and/or houses.

- ☐ Located away from environmentally-sensitive areas.
- ☐ Located close to the livestock facility or have clear access for transport.
- ☐ Clear of overhead utility lines.
- ☐ Void of excess water.
- ☐ Located on a gentle slope (1%-3%) so there will be no water ponding.
- ☐ If so, is there a sufficient local supply of carbon source such as wood chips (3 pounds carbon source per pound of livestock)?
- ☐ If so, have you arranged for the necessary equipment and supplies to be delivered to the site?
  - ☐ Personnel
  - ☐ Composting supplies and carbon source
  - ☐ Personal protective equipment
  - ☐ Personal supplies
  - ☐ Cleaning and disinfecting (biosafety) supplies
  - ☐ Hand tools
  - ☐ Heavy equipment (mid-size skid-steer loaders, tractors with bucket loaders, excavators, bulldozers, payloaders, forklifts, trucks, containers and caps, polyethylene material for lining carcass transport containers)
- ☐ If answer to all above questions is yes, then see **Outdoor Composting** training module at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml) and implement composting. **If not,**

## ☐ Third Option - Is rendering available?

- ☐ See a complete list of renderers at <http://nationalrenderers.org/about/directory> or the EPA database at <http://www2.ergweb.com/bdrtool/login.asp>.
  - ☐ Logon to the I-WASTE Tool and obtain a password if you do not currently have one.
  - ☐ Enter userid and password.
  - ☐ Choose treatment and disposal facilities bottom on the lower left.
  - ☐ Enter filter criteria such as “facility type (e.g., rendering, incinerators, or landfill)”

- ☐ Enter State or EPA region, and click “View List of Facilities” button.
- ☐ Contact facilities and determine if they will accept your livestock and meet your needs.
- ☐ If the capacity is less than needed, can the carcasses be stored/refrigerated while awaiting disposal?
- ☐ Transport to rendering facility for disposal.
- ☐ If rendering is an option, see **Secure Transport** and **Off-Site Treatment/Burial** training modules at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml) and implement off-site rendering. **If not,**

### ☐ Fourth Option - If not, can off-site permitted landfill be used?

- ☐ See a complete list of landfills at or the EPA database at <http://www2.ergweb.com/bdrtool/login.asp> .
  - ☐ Logon to the I-WASTE Tool and obtain a password if you do not currently have one.
  - ☐ Enter userid and password.
  - ☐ Choose treatment and disposal facilities bottom on the lower left.
  - ☐ Enter filter criteria such as “facility type (e.g., rendering, incinerators, or landfill)”
  - ☐ Enter State or EPA region, and click “View List of Facilities” button.
- ☐ Contact facilities and determine if they will accept your livestock and meet your needs.
- ☐ Transport to off-site permitted landfill facility for disposal.
- ☐ If the answer is yes to all the above questions, then implement off-site treatment and see the **Secure Transport** and **Off-Site Treatment/Burial** training module at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml).

### ☐ Fifth Option - If not, can off-site incinerator be used?

- ☐ See a complete list of incinerators at or the EPA database at <http://www2.ergweb.com/bdrtool/login.asp> .
  - ☐ Logon to the I-WASTE Tool and obtain a password if you do not currently have one.
  - ☐ Enter userid and password.

- ☐ Choose treatment and disposal facilities bottom on the lower left.
- ☐ Enter filter criteria such as “facility type (e.g., rendering, incinerators, or landfill)”
- ☐ Enter State or EPA region, and click “View List of Facilities” button.
- ☐ Contact facilities and determine if they will accept your livestock and meet your needs.
- ☐ Transport to off-site incineration facility for disposal.
- ☐ If the answer is yes to all the above questions, then implement off-site treatment and see the **Secure Transport and Off-Site Treatment/Burial** training module at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml).

### ☐ Sixth Option - Is site suitable for open air burning?

- ☐ Based on the expert written opinion of an experienced air quality specialist, will open burning release air pollutants in excess of public health standards? If not,
- ☐ Does the applicable permitting authority allow open air burning?
  - ☐ Local Fire Department
  - ☐ State Department of Agriculture, Animal Health
  - ☐ State Department of Environment or Natural Resources
  - ☐ USDA-APHIS
  - ☐ USEPA
- ☐ If so, can the permit conditions be met?
- ☐ If so, is there an adequate source of combustible material such as fire wood to keep the fire going?
- ☐ If open air burning is an option, see **On-Site Treatment/Burial** training module at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml) and implement on-site open air burning. **If not,**

### ☐ Seventh Option - Is site suitable for on-site burial?

- ☐ Are soils suitable (see USDA NRCS online Web Soil Survey)? If so,
- ☐ Based on the expert written opinion of an experienced groundwater hydrologist, will leachate contaminate groundwater in excess of public health standards? If not,

- ☐ Is adequate land available for on-site burial? If so,
- ☐ Is burial permitted by applicable regulatory authorities? Can permit requirements be met?
- ☐ Will land owner accept on-site burial and associated environmental liabilities?
- ☐ If on-site burial is an option, see the **On-Site Treatment/Burial** training module at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml).

## ☐ **Eighth Option - Are mobile treatment technologies available for your area?**

- ☐ Contact all appropriate mobile treatment technology vendors.
  - ☐ Verify the units are available for deployment to your site.
  - ☐ Verify your ability to meet all site/utility requirements.
  - ☐ Verify units can be fully disinfected after use.
  - ☐ Verify the units have adequate capacity to meet your needs.
  - ☐ If the capacity is less than needed, can the carcasses be stored/refrigerated while awaiting disposal?
  - ☐ Verify the availability of skilled operators and spare parts to keep the units operational.
- ☐ Is the technology permitted by the applicable regulatory authorities?
  - ☐ State Department of Agriculture, Animal Health
  - ☐ State Department of Environment or Natural Resources
  - ☐ USDA-APHIS
  - ☐ USEPA
- ☐ If so, can the permit conditions be met?
- ☐ If so, can the technology process byproducts be readily disposed?
- ☐ If the answer is yes to all the above questions, then see **On-Site Treatment/Burial** training module at [www.aphis.usda.gov/emergency\\_response/tools/aphis\\_role\\_emergency\\_tools.shtml](http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools.shtml) and implement on-site mobile technologies.

### *Breakout Session - Practice Using Disposal Tools*

The two hour breakout session was the key to this workshop. All participants were pre-identified to “breakout” into groups and solve the ultimate problem presented in the read ahead material and the scenario. How do we dispose of 20K head of cattle after an FMD outbreak? Each group had a pre-identified facilitator and note taker and assigned participants based on their respective organizations/role. The specific comments captured from all groups using the tools for each disposal option are presented in the following table, Table 1: Key Discussion Items / Recommendations to the Exercise.

At the end of the breakout session, the group reconvened and shared their thoughts/comments/recommendations via the facilitated action items and next steps discussion recorded in section 6.0 Outbrief Session and Next Steps. Note: All Comments discussed are listed in the table even though not all comments agree with each other. Additionally, to obtain a copy of the materials (Disposal Tools, Exercise Facilitator Guide and Exercise Participant Guide) used for this exercise, please contact Stacey Tyler, Event Coordinator, at [stacey.tyler@cubic.com](mailto:stacey.tyler@cubic.com). The materials are in a revision state, but have been designed to be “exported” as learning materials as part of a key objective to this workshop. The end goal will be to use these materials in other agricultural response communities in the United States.

**Table 1: Key Discussion Items / Recommendation to the Exercise**

Category	Discussion Point
<b>INTRODUCTION</b>	
<b>Statistics</b>	<ul style="list-style-type: none"> <li>• A Subject Matter Expert (SME) added that Weld County leads the nation (not just the state) in animal rankings listed.</li> <li>• Suggestion to verify that “level 3” is the correct number rather than “level 2” because of the infectivity of the disease.</li> <li>• Larimer County and Weld County both accept carcasses at present time.</li> <li>• Weld County allows open burning of mortalities on private property.</li> </ul>
<b>24/48 Rule</b>	<ul style="list-style-type: none"> <li>• Some participants had an issues with the feasibility of this requirement</li> </ul>
<b>Key Observations from introductory material</b>	<ul style="list-style-type: none"> <li>• Animals could be quarantined first and then depopulated in stages.</li> <li>• Transportation of dead animals is better due to inactivation of virus.</li> <li>• High temperatures may not allow spread of virus as easily.</li> <li>• Clarified that the focus this effort is only on disposal. Not focused on depopulation.</li> <li>• Reiterate that waste is not intended for food.</li> <li>• Won’t find one just cow affected due to high degree of contagiousness. Three days of spreading. Day 4 exponential.</li> <li>• Disposal options need to be linked to the depopulation process.</li> <li>• Large amount of sampling and diagnostics on surrounding premises for susceptible livestock.</li> <li>• Is there routine surveillance for FMD? No, not usually. Testing generally takes a few hours. Location, movement data from facilities considered with respect to tracking disease issues. Positive tests would freeze movements. Negative tests with clinical signs and under hold order either release or quarantine would result. Test results can take 24-hours . Note, clinical signs may not necessarily be FMD.</li> </ul>
<b>General</b>	<ul style="list-style-type: none"> <li>• Would the 3D contractors from the State Veterinary Stockpile be helpful in decision making process or only during the actual disposal process?</li> </ul>
<b>COMPOSTING</b>	
<b>Suitability Questions/Comments</b>	<ul style="list-style-type: none"> <li>• Well locations on feedlots are of concern</li> <li>• Huge amounts of carbon are needed</li> <li>• Composting would stall normal feedlot operations over several months</li> <li>• What is the temperature at which FMD will be destroyed via composting?</li> <li>• What procedures would need to be implemented to prevent scavengers from taking part of the cows from the compost locations?</li> </ul>

Category	Discussion Point
	<ul style="list-style-type: none"> <li>• Need to review the soil conditions, water conditions, proximity to feedlot, availability of carbon materials, etc.</li> <li>• After death, the pH level goes down.</li> <li>• While there is a textbook solution, composting is the preferred method.</li> <li>• Identify people close by that do it commercially. Try to do the composting procedure everyday so a significant event isn't new.</li> <li>• Use of Federal or State/public lands preferred.</li> <li>• Most feedlots have a supply of hay to aid, but not best suited. Corn is better. Woodchips are best.</li> <li>• Wouldn't want to compost whole carcasses. Splay them out.</li> <li>• Feed cattle are not mature. They enter at 500lbs and go out at 1300 lbs. Due to this, may get a few more per acre.</li> <li>• There is not enough land, but if you did have the land it would be a good solution.</li> <li>• Cannot consider one disposal method until all are considered. A decision tree may not be the best application.</li> <li>• Duties considered here would likely be assigned to an incident management team with specialists in support.</li> <li>• Presumption that composting can be used off-site. CDPHE initial discussion is that it would not be allowed for off-site use. Requires discussion.</li> <li>• Grinding/quartering/limb removal before composting to reduce space requirement/speed up composting process. Bones and limbs can be slow to compost.</li> <li>• Big risk in moving the carcasses.</li> <li>• Change numbers in guide to "composting has been demonstrated to inactivate the AI virus in <b>10</b> days...when temps reach <b>120</b> deg F.</li> <li>• Add grinder to the list of equipment used in composting.</li> <li>• Are there potential for exemptions? Needs to be asked.</li> <li>• Need to determine if adjacent properties available (e.g., landowner owns several parcels). Will this be allowed. Consideration must be given to assuring disease not allowed off-site. Can we free up more acres on a property through waivers?</li> <li>• One advantage of composting is some of the protein can be reclaimed for beneficial use.</li> <li>• Suggest that an expert farmer composter be hired.</li> <li>• Extra water is needed for composting</li> <li>• Hauling carbon into the facilities could cause contamination of other facilities if trucks are not adequately decontaminated.</li> <li>• Why is the 10km quarantine zone chosen?</li> <li>• Flies are a concern for composting because of the heat composting generates.</li> <li>• Suggestion to research if corn stalks could be used, although it would be an expensive option.</li> <li>• What is a windrow? Need to include a description on how cows are composted and how piles should be established.</li> <li>• Quarantine time may vary, approximately 30 days after Cease &amp; Desist for FMD.</li> </ul>



Category	Discussion Point
	<ul style="list-style-type: none"> <li>• How effective is composting for large animals? Especially with bones that remain after decomposition is complete.</li> </ul>
<b>Scenario Specific Questions/Remarks</b>	<ul style="list-style-type: none"> <li>• Are there landfills nearby that could provide carbon for free?</li> <li>• Need to hire a specialist</li> <li>• Composting not viable.</li> <li>• Information not sufficient. Seems to not be realistic.</li> <li>• Where are the wells located? There is no slope information provided. Drainage patterns are unclear.</li> <li>• There is not enough land to compost.</li> <li>• Is there a railroad by the site?</li> <li>• Can the farmer use his silage compost?</li> <li>• Need to determine what carbon sources are available in the area.</li> <li>• Made assumption that state would provide necessary equipment and supplies.</li> <li>• Probably not away from neighbors and out of sight.</li> <li>• Recognizing this is the first feedlot in the country, what are the potential implications? For clearing feedlot, manure scraped and use in compost to clean the feedlot as well as used as carbon materials for composting.</li> <li>• Go to railroad for woodchips.</li> <li>• Some considerations are that you might not be able to get the carbon source in enough time</li> <li>• People think that beetle kill trees should be used but there is not a facility to process these trees</li> <li>• Enough ground to do it, only one highway that is present.</li> <li>• Many feed lots may already meet criteria.</li> <li>• Carbon sources are different. More Alfalfa would be required.</li> <li>• Do we need to keep away from highways?</li> <li>• Regulatory considerations must be considered. Also must consider distance to neighbors. Composting likely not an option given residential density as per scenario.</li> <li>• Need formulas with the variety of carbon sources choices.</li> <li>• Unclear as to why the rest of the acreage is unusable.</li> <li>• Time spent using composting area renders area not useable.</li> <li>• USDA has to buy the animals and land prior to execution.</li> <li>• Area has a high number of feedlots. Neighbors probably not an issue.</li> <li>• Hay and alfalfa are too expensive to consider for use with the current drought in Colorado.</li> </ul>
<b>Closing Comments</b>	<ul style="list-style-type: none"> <li>• Not a viable option for stated scenario</li> <li>• Education on this process is critical</li> <li>• Need to identify proper security protocols to prevent public access</li> </ul>

Category	Discussion Point
	<ul style="list-style-type: none"> <li>• Need to address public perception concerns of large composting piles that are aesthetically unappealing and have possible strong bad odor.</li> <li>• Some feedlots have a dedicated area where they grow material to help mitigate transport costs for feed – this could be an area where cows can be composted</li> <li>• Add a grinder to the heavy equipment list on the checklist.</li> <li>• May need to provide long-term security.</li> <li>• Quartering and grinding prior to composting are possible solutions that will help</li> <li>• The smaller you make the cow the less carbon material you need and the faster it composts – removing the limbs prior to composting makes it more effective.</li> <li>• Consider labor costs, it is very labor and time intensive to break down cow carcasses</li> <li>• Composting is not a feasible solution for this scenario.</li> <li>• Comment: government in Wyoming would find a property owned by the state and bury the carcasses.</li> <li>• Make use of state resources at Colorado State University (CSU) (geospatial)</li> </ul>
<b>RENDERING</b>	
<b>Suitability</b> <b>Questions/Comments</b>	<ul style="list-style-type: none"> <li>• Not a primary disposal method, but could be used in combination with other efforts.</li> <li>• The capacity of renderers is unknown.</li> <li>• There could be a public issue/concern with this process. Education would be needed.</li> <li>• Can renderers legally process infected cattle? Other customers could have an issue with this. More research would be needed.</li> <li>• What is the average cost of this process?</li> <li>• Government would pay for this so it would be helpful for it to be negotiated and in place in advance.</li> <li>• Could packing plants be a limiting factor?</li> <li>• Feedback For Terminology - Feedlots do not have cows, they have steers and heifers. (castrated males and unimpregnated females)</li> <li>• If there are stop movement orders, renderers will not be normally receiving carcasses from other places so there is no concern for capacity.</li> <li>• The feds would set prices for rendering costs because they would be the one funding the disposal during a wide-spread emergency.</li> <li>• Not in Wyoming: The cost is \$40 per carcass for swine.</li> <li>• Capacity important question up-front.</li> <li>• Refrigeration limited. Note the carcass core will remain hot for days.</li> <li>• Transport would be a poor option – animals would likely be required to remain on-site to assure any quarantine maintained or disease animals remain within zone.</li> </ul>

Category	Discussion Point
	<ul style="list-style-type: none"> <li>• Rendering not an option.</li> <li>• Do not think that an intact cow could bloat.</li> <li>• Is a vaccine to kill an option?</li> <li>• If animals have been depopulated and have been lying around 48+ hours, will the renderer still take them?</li> <li>• Cannot depopulate until it is known where to put them!</li> <li>• How they are killed is a pacing issue. If they're shot, it takes time.</li> </ul>
Scenario Specific Questions/Remarks	<ul style="list-style-type: none"> <li>• There is a rendering facility in Greeley.</li> <li>• If rendering plant 1 can only take 280 cows a day, can they take other customers uninfected livestock?</li> <li>• Transportation concerns came up as an issue in this discussion section.</li> <li>• In this situation, assuming 280 cows, could a refrigeration truck be there in time or can the animals be kept cool to prevent gases from being a problem?</li> <li>• To get around the scenario barriers and capacities, make agreements before it happens, also discuss compensation.</li> <li>• With stop movement, the rendering plant's normal incoming cattle would not be around.</li> <li>• Rendering is available in the area. There to service the packing plant. They don't take fatalities.</li> <li>• It's an option. Rendering plants sometimes pay for product. "Offal" is the guts.</li> <li>• Don't need refrigeration truck.</li> <li>• Rendering 280 off by a factor of 2. Should be 140/day.</li> <li>• Requires 690 refrigerated trucks. Cost of diesel fuel considered and mechanical conditions of trucks could cause problems.</li> </ul>
Closing Comments/Questions Remarks	<ul style="list-style-type: none"> <li>• This option may be viable for small numbers of animals because of the 48 hour timeframe.</li> <li>• Determine vaccination suitability (research lag time).</li> <li>• Can depopulation be staggered so more livestock could be sent to renderers?</li> <li>• Maybe landfill is better option because rendering requires animals be kept alive longer.</li> <li>• Suggest depopulation must be done quickly to avoid spread of FMD.</li> <li>• Not enough time to do this in 48 hours.</li> <li>• While they don't explode, they will swell making time critical in movement.</li> <li>• Capacity is a key issue.</li> <li>• Not viable in a large scale scenario. If you could access thirty to fifty trucks (refrigerated trucks are usually used by food companies. Questioned how quick would these companies be to allow use of their trucks) the amount of time to transport the carcasses would be far too long.</li> <li>• Transportation is risky, possibility of spreading virus.</li> </ul>
<b>OFF-SITE PERMITTED LANDFILL</b>	
Suitability	<ul style="list-style-type: none"> <li>• Decomposition is slower with burial.</li> </ul>

Category	Discussion Point
Questions/Comments	<ul style="list-style-type: none"> <li>• May be able to use multiple landfills.</li> <li>• Are veterinarians needed for depopulation at the landfill?</li> <li>• There is concern with the survivability of pathogens. Leachate is managed so this may not be an issue. Landfills are typically sited in a suitable geological area, 24" of clay, and 6" layer of sand as a drainage layer to move leachate to drainage pipes.</li> <li>• Animals should get covered immediately with an impermeable layer or 6" of clay.</li> <li>• Long term concern – unsure that landfills will have high enough temperature to kill the disease.</li> <li>• What would happen to the regular trash while the facility is taking the cows?</li> <li>• What are the biosecurity effects of the landfill?</li> <li>• Are there varmints or scavenger pest issue? Can the disease be transmitted via pests?</li> <li>• EPA – off-site landfills – prepare a pit line it and cover it up. Get an exemption on state property.</li> <li>• Concern is that there may be contaminated water supply for ten years.</li> <li>• Would re-imbursement be required especially if a landfill needs to be closed during emergency operations?</li> <li>• What about general municipal solid waste (MSW) collection?</li> <li>• Pre-arranged agreements are necessary. This is likely the best option given limitations for other options.</li> <li>• Transportation would likely be any available end-dump, side dump, trailers, etc. made leak proof as possible using plastic. Air is a minor consideration, but less so than a live animal. It is logistically easier. Estimated 50 trucks (semis also an option). Carcass not much of a host due to pH. Bodily secretions for a minimal amount of time an issue (urine, manure, saliva, etc.). Recommend changing disposal matrix pathogen inactivation for landfills to a 2, not a 1. Possibly even a 3. Virus will be buried – quick burial necessary.</li> <li>• Consideration must be given to truck/transport decontamination (includes collection and treatment of decontamination water/materials).</li> <li>• Disinfectants available.</li> <li>• Containers are not optimal for transshipment due to carcass swelling. Need open top trailers.</li> <li>• Cleaning and disinfection of the transport mechanism is critical. Wash down truck bed, tires and undercarriage. Every time.</li> <li>• Check the temperature for virus inactivation. Materials state 140 deg F</li> </ul>
Scenario Specific Questions/Remarks	<ul style="list-style-type: none"> <li>• Colorado is dry so methane gas concerns would be high.</li> <li>• There is a short distance to the landfill. Could transport the livestock and then depopulate at landfill.</li> <li>• Weld Co. landfills are lined. Could have enough landmass to accommodate 20K.</li> <li>• This may be a viable option even due to sheer number of animals, drive time, loading &amp; unloading, Cease &amp; Desist.</li> <li>• Willingness to accept carcasses is an issue.</li> <li>• Concern raised about transportation routes and maintaining on-site roadways that are isolated from general public.</li> <li>• Use numerous trucking companies that are available in CO.</li> </ul>

Category	Discussion Point
	<ul style="list-style-type: none"> <li>• Trucks would have to go through wash facility after dropping off animals.</li> <li>• While the landfill states they can take the waste, it needs to be verified prior to transport.</li> <li>• What would happen to the regular trash while the facility is taking the cows?</li> <li>• What are the biosecurity impacts at the landfill?</li> <li>• Is there a varmint or scavenger pest issue? Disease can be transmitted via pests?</li> <li>• Do not think it is possible for the landfill to take more than 5K cattle.</li> <li>• There may be a total capacity of 333 containers needed, but they can be re-used.</li> <li>• The Laramie landfill accepts carcasses. Whatever they can cover up immediately, they will generally take. As long as they get approval from the state.</li> <li>• Are the landfills lined and ready to take carcasses? Waivers are considered.</li> <li>• Landfill will charge plenty.</li> <li>• Main limitation is how many they can take.</li> <li>• 333 containers – not feasible. But you could possibly do with a smaller number. Running a 24 hour cycle for two days, use 33 trucks – six trips (assumed 4 hours each trip) each day – the carcasses would be disposed of in two days.</li> <li>• Participants felt the agreement to fast-track a new land fill would be the needed encouragement needed for the landfill to take all of the carcasses.</li> </ul>
<b>Closing Comments/Questions Remarks</b>	<ul style="list-style-type: none"> <li>• Consideration for landfill – mobile equipment is needed to load carcasses into the landfill</li> <li>• Advantage – there are lots of waste disposal containers</li> <li>• Re-using the same transportation path/corridor and re-using the same containers.</li> <li>• Where would decontamination take place? What are decontamination procedures? Every trip, or every day? What needs to be decontaminated?</li> <li>• What transportation routes need to be established?</li> <li>• What environmental impacts are established?</li> <li>• Virus is inactive within 8 hours of death.</li> <li>• Landfill will likely shut down while conducting carcass disposal operations.</li> <li>• The first three options all show up well for the environment.</li> <li>• In Weld County, Colorado if you drop FMD in the middle of the feedlot areas, a six mile radius could affect up to 500,000 head of cattle. But this exercise is useful because the work to get rid of 20,000 head of cattle gives us a good indication of the size of the problem.</li> <li>• If FMD does not transfer to humans...couldn't you slaughter the cattle and still sell the meat? Media nightmare, affects other cows, affects their ability to eat, walk, reproduce.</li> <li>• Environmental concerns are outweighed by the need to dispose of carcasses quickly. Risk worth taking? In this the group would not consider another partial solution.</li> </ul>

Category	Discussion Point
	<ul style="list-style-type: none"> <li>• What happens to the regular trash?</li> <li>• Can they really take that capacity? What is their limit? What if the feedlot up the street was infected too? One group thought they could only really take 5K.</li> <li>• Will it be cost efficient to cycle the trucks back and forth?</li> <li>• What sort of biosecurity measures need to be employed?</li> </ul>
<b>OFF-SITE INCINERATOR</b>	
<b>Suitability Questions/Comments</b>	<ul style="list-style-type: none"> <li>• Concerns with air quality, capacity limits, and labor requirements</li> <li>• Concerns with costs and fuel requirements due to the amount of moisture in carcasses</li> <li>• Concern with virus aerosolization.</li> <li>• Animals take a long time to burn due to water content in their bodies.</li> <li>• Cost prohibitive.</li> <li>• Advantage: Deactivates virus, permits might be waived in the event of an emergency, kills pathogen.</li> <li>• Dis-advantage: Small, takes forever, about 2 animals per day, smelly, environment effects, expensive, high fuel consumption, most are not big enough for large animals.</li> <li>• Not recommended. Permits make it infeasible.</li> <li>• Takes an excessive amount of fuel to burn.</li> <li>• Too slow and costly. Not feasible.</li> <li>• Ash would likely require a waiver at very least for testing/sampling prior to disposal.</li> <li>• Out-of-Box: Could coal fired electrical plants be used to handle large volumes of animals (burns extremely hot and requires large amount of fuels).</li> </ul>
<b>Scenario Specific Questions/Remarks</b>	<ul style="list-style-type: none"> <li>• Facility may not be able to take 1000 cows but not possible to send 1000 through incinerator in 48 hours.</li> <li>• No costing provided in scenario</li> <li>• Math needs to be verified in this section.</li> <li>• Only small incinerators in Colorado (vet offices) and no commercial incinerators are available.</li> <li>• None of the incinerator options are valid for large animals. Max. likely 56 tons/day.</li> </ul>
<b>Closing Comments/Questions Remarks</b>	<ul style="list-style-type: none"> <li>• This is not a viable option.</li> <li>• The feds would be responsible if we needed to fund this option.</li> <li>• The best way to prepare carcasses for incineration is to “cut them up.”</li> <li>• The ash would need to be disposed in a landfill.</li> <li>• The missing items from the checklist include: Cease &amp; Desist process for the incinerator site, and determine the variances on</li> </ul>

Category	Discussion Point
	the air report.
<b>OPEN BURNING</b>	
<b>Suitability Questions/Comments</b>	<ul style="list-style-type: none"> <li>• Who pays for the cost of open burning?</li> <li>• Concern with virus aerosolization.</li> <li>• The virus creates immunity after 2 weeks naturally. No need to vaccinate.</li> <li>• Economic issues with this option.</li> <li>• Other countries may not buy cattle or people may not eat it.</li> <li>• Education is important.</li> <li>• Public Affairs issues need to be considered.</li> <li>• There are cheaper options.</li> <li>• What control measures need to be put in place to prevent the fire from spreading?</li> <li>• Need to determine what type of fuel is acceptable to burn.</li> <li>• Consider the human health affects – smoke and ash inhalation from areas that are nearby homes.</li> <li>• Too unsightly. Not a good option. Not recommended. Emotional considerations.</li> <li>• Consideration of Air Quality Division regulations and attainment versus non-attainment required.</li> <li>• What would require testing and at what frequency water ash and soils?</li> <li>• Consideration must be given to parts not burned, bury in place, landfill?</li> <li>• Add distinction between composting materials needed and pyre materials needed.</li> </ul>
<b>Scenario Specific Questions/Remarks</b>	<ul style="list-style-type: none"> <li>• There is an exemption that allows burning in Colorado if there is a disease declared by the State Veterinarian.</li> <li>• Too much volume for this to be an option.</li> <li>• The state would make decisions about the feasibility of this option.</li> <li>• How close is this to the community and what is appropriate?</li> <li>• This is not a good option because you need to re-route traffic, the site is located right on US 85 and near residential.</li> <li>• Need to address whether or not the railway is freight or passenger.</li> <li>• 1500 bales of straw, 1500 small timbers, 12.5 tons, 125 tons of coal, 500 gallons of fuel = not a viable option due to cost</li> </ul>
<b>Closing Comments/Questions Remarks</b>	<ul style="list-style-type: none"> <li>• Due to public perception, open air burning would not be authorized unless in extraordinary circumstances.</li> <li>• The State of Colorado, unified command, according to Colorado Department of Ag, would make the decisions on this process.</li> <li>• Provide more updated fuel source data; newer than 2005 is available.</li> <li>• Perhaps a rural area could accommodate open burning?</li> </ul>

Category	Discussion Point
	<ul style="list-style-type: none"> <li>Public would hate this.</li> <li>How close could this option be to the population? Forests? What controls need to be available?</li> </ul>
<b>ON-SITE BURIAL</b>	
<b>Suitability Questions/Comments</b>	<ul style="list-style-type: none"> <li>Concern with leachate and proximity to groundwater.</li> <li>Group brought up point that in the UK ground began to bubble because of methane production from the burial.</li> <li>Person who buries the cows will have to live with the long term potential decline of values and environmental issues.</li> <li>Viable option if necessary to keep animals on site due to risk of transmissibility of virus or public perception if all factors are favorable.</li> <li>Lining is not necessary if there is clay in the soil and no fractured bedrock or a water table.</li> <li>If you bury carcasses on-site it restricts future use of the property (land owners can't sell their land for residential use)</li> <li>If there is no room to compost, there is not enough room to bury either.</li> <li>Not a viable option due to soil composition.</li> <li>How many can safely be buried on-site (being addressed by DOA and CDPHE)?</li> <li>Once soil is compacted, how would leachate be addressed?</li> <li>Leachate generation versus number of animals as associated with hydrogeological aspects of the site will require consideration.</li> <li>Pathogen inactivation may be underestimated burial option. Other considerations include type of disease. FMD would likely inactivate quickly. Need to re-assess pathogen inactivation for all topics.</li> <li>Comment made on how warm a carcass would remain underground in a reducing environment? Group unsure.</li> </ul>
<b>Scenario Specific Questions/Remarks</b>	<ul style="list-style-type: none"> <li>May not be suitable for this site, but would be ok for other sites.</li> <li>Would need to bring in a soil engineer to figure out the soil compaction rates given the soil type to prevent leachate mobility.</li> <li>Will run out of space for burial considering the high number of mortalities.</li> <li>Least desirable method of all disposal methods. If transportation is not allowed, would recommend on-site open air burning rather than burial.</li> <li>Advantage – the location (scenario) makes contractors and equipment more readily available Disadvantages – in many areas, feedlots are close to residential areas meaning they are in city property and not county property – would require permits</li> </ul>
<b>Closing Comments/Questions Remarks</b>	<ul style="list-style-type: none"> <li>This could be an option, but would not select as primary because of land-use restrictions.</li> <li>More information regarding zoning and land-use is needed.</li> </ul>



Category	Discussion Point
	<ul style="list-style-type: none"> <li>Suffering animals will be taken down immediately. Others will be vaccinated.</li> </ul>
<b>MOBILE TREATMENT TECHNOLOGIES</b>	
<b>Suitability Questions/Comments</b>	<ul style="list-style-type: none"> <li>If a part breaks down then they would have to find another solution because the parts would have to be custom made.</li> <li>What is the real availability and location of these technologies?</li> <li>Concern that only a small amount of animals can be processed.</li> <li>Costs to purchase “just in case of disease outbreak” may not be justified.</li> <li>Ok for R&amp;D, but not for actual use except for small numbers.</li> <li>US – vaccinated hurt our ability to export cattle.</li> <li>200 tons per day max. Considered actual capacity.</li> <li>Alkaline hydrolysis not portable. Available equipment can do about 3/day.</li> <li>Air curtain would require lots of auxiliary fuel. Problematic.</li> <li>Microwave sterilization – leaves a gooey mess.</li> <li>Volume issues with Mobile Treatment Tech.</li> <li>Likely very expensive and many still in a research stage (being developed).</li> </ul> <p>Four biomass boilers in CO that might be available for wood chips. Montana chips beetle kill trees and has a large excess of wood chips (point, there may be a large wood chip/carbon source that simply needs to be identified).</p>
<b>Scenario Specific Questions/Remarks</b>	<ul style="list-style-type: none"> <li>Comment from participant group that technology number 2 can process 20K of cats and dogs. But the machine breaks a lot. You could be aerosoling the disease from cows in the “cow chipper”. Maybe not that safe. Could cause more problems than started with.</li> <li>For this scenario, use natural gas. Tap into pipelines for some of the portable disposal technologies.</li> <li>The viability of mobile technologies is not reasonable. They can only process small numbers of animals.</li> </ul>
<b>Closing Comments/Questions Remarks</b>	<ul style="list-style-type: none"> <li>Comments made about the decision tools in general are that they useful for educational purposes, but not realistic for large volume feedlots.</li> <li>Tools could be improved for true emergency situations.</li> <li>Technology is not recommended because of air pollution, amount of fuel, costs, and public perception.</li> <li>Could be used in an emergency situation if other disposal methods were at capacity.</li> <li>Limited capacity and expense make mobile technologies less desirable.</li> <li>Anecdote: Gamma radiation used on infected meat eliminates all contaminants. Not approved for use in the US.</li> </ul>
<b>CONCLUSION OF BREAKOUT SESSION</b>	
<b>Closing</b>	<ul style="list-style-type: none"> <li>There is a need for carbon sources in this area including fuel (wood chips, etc). The question is, where do we get it and how</li> </ul>

Category	Discussion Point
<b>Comments/Questions Remarks</b>	<p>do we afford it? Maybe it would be a great idea to create a stockpile of carbon sources in addition to national stockpile of vaccine.</p> <ul style="list-style-type: none"> <li>• The information for the checklist should be updated using the USDA Redbook (for fire bed information)</li> <li>• It should be noted that public perception often trumps science; it interferes with our ability to dispose of carcasses in a logical way.</li> <li>• Suggest the region pre-identify all routes between feedlots and rendering facilities, incorporate Colorado Highway Patrol (CHP) plans into the Ag plan since they already exist.</li> <li>• Limited consensus...vaccinate to slaughter make the most sense.</li> <li>• Consideration of the technology versus percentage of the total volume required for disposal important. If the technology can only handle small percentages of total – not worth time/expense.</li> <li>• Man hours a consideration – what is required?</li> <li>• Concern rose that not all matrix options will be able to be implemented at once.</li> <li>• This can't be done, we should be vaccinating and educating the public.</li> <li>• Landfill appears to be the best option, but don't think they can really handle it.</li> <li>• Need to be proactive and do this research ahead of time.</li> <li>• Like the checklist – think it is very helpful. But, it is only going to offer same conclusion, that this doesn't work. It is useful for education/pre-planning, but not actual events.</li> <li>• Need to set up a public forum to educate the farmers, not directing them to the web.</li> <li>• This could work for small farms (i.e., UK farms), but not for large farms (i.e., US production farms).</li> </ul>

## 6.0 Overall Comments – Outbrief and Next Steps

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This section was facilitated by Garry Briese, the Local WARRP Program Integrator. Participants shared their observations and overall themes from the experience of the facilitated breakout session and the workshop content overall. The discussion is summarized into categories below including some recommended actions to consider.

### Overall Comments/Actions

- Public perception drives decision making, even though experts are emergency managers and scientists.
- There is an overall need for more resources – personnel, transportation, carbon sources, and funds.
- If this ends up involving more states, the urgency will change.
- We are a land of plenty, we have a robust agriculture industry – this comes with a great deal of responsibility.

### Technical Considerations including Disposal Options

- Composting - The biggest issue with composting in Colorado is lack of moisture rather than too much moisture.
- Carbon sources for composting – feedlots are in places where there are lots of carbon sources, Alfalfa, corn husks, and many of the resources needed to compost are already located on-site.
- If on-site burial is an option, then so is composting. However, composting is generally considered a better option.
- Consider animal welfare; be more selective with stamping out and stamp out the animals that are suffering first.
- Vaccinate to slaughter and vaccinate to live both have legal implications. “Do we have *the stomach* to do what needs to be done?”
- Landfill option – need biosecurity measures in place.
- Incineration and open air burning were not considered feasible options.

### Transportation Considerations Comments

- Transport is a limiting factor for rendering.
- Round-bottom trucks used to transport could accommodate the expansion of cattle.

### The Tools (MaTCh) and Learning Package Comments

- The checklist and matrix would be great for pre-planning, not for actual use in an emergency because it would take so long. You would spend 48 hours just getting answers to questions before you could even start mobilizing resources.

- This would be a great exercise to bring to the farmers themselves. This would enable us to be proactive by bringing it to the industry groups; they would get a lot out of it. This workshop overall was a testament to proactive education.
- Indemnification of compensation guidelines have been released – should incorporate into the checklist or assumptions.
- There was too much script, too many assumptions, and the scenario can be too limiting.
- There is limitation in the usefulness of tools; especially the decision tree. Going down in a sequential order might not be the most practical. Might be best to consider more than one option at a time.
- The Decision Matrix – debate over the values (e.g., oversimplifying pathogen inactivation). Maybe need to look more into the decision-making that resulted in the ratings.
- The Decision Checklist was helpful to further discussion in this area.

### Plans/Guidelines Comments

- The State of Colorado should add these decision tools to their state plans.
  - The target number that the state should be able to handle is all the livestock in their state.
- National Cattlemen's Beef Association (NCBA) has a lot of issues that compete for their attention and they do not address FMD at this level. It is at the bottom of the priority list.
  - If we don't know what the plan is, then it is hard to prepare. They won't invest money without directions and a plan. New plans are more compatible with the interests of the industry.
- If they are within 6.2 miles then the cattle will need to be put down. These are old guidelines.

## **7.0 Conclusion**

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The WARRP Knowledge Enhancement Workshop on Agricultural Waste Disposal came to a close with a few words from Garry Briese, Local WARRP Program Integrator and a summary of suggestions from participants contained in the above table. Additionally, Ms. Lori Miller thanked all the participants for their contributions and it benefits our national preparedness. Dr. Keith Roehr shared appreciation for all the agencies that are participated. He emphasized the importance of building of personal relationships and gaining mutual understanding.

Material contained in this report will:

- 1) Be used to further develop the Denver UASI and State of Colorado All-Hazards Regional Recovery Framework with CBR Annexes and the Colorado Feedlot Plan.
- 2) Be used to further refine and develop the existing Agricultural Waste Disposal Workshop materials to make the product an exportable learning package.
- 3) Further enhance the USDA on-line learning tools.

# Annex A – Agenda

July 17, 2012

0800 - 0815	Registration
0815 – 0830	<p>– <b>Welcome: Introductions, Review of Workshop Objectives, Agenda</b></p> <p>Speakers: Stacey Tyler, Cubic Applications Inc. Lori Miller, Department of Homeland Security / US Department of Agriculture Dr. Keith Roehr, State Veterinarian of Colorado</p>
0830 - 0845	<p>– <b>Topic: Epidemiology of Foot &amp; Mouth Disease (FMD)</b></p> <p>Speakers: Dr. Dave Van Metre, Colorado State University</p>
0845 – 0905	<p>– <b>Topic: Current Colorado Plans for FMD Response &amp; Recovery</b></p> <p>Speaker: Dr. Nick Striegel, Colorado Department of Agriculture</p>
0905 – 0925	<p>– <b>Topic: Current USDA &amp; Federal FMD Response</b></p> <p>Speaker: Dr. Jim Williams, Colorado Area Emergency Coordinator for USDA APHIS</p>
0925 – 0945	<p>– <b>Topic: USDA/HLS HQ Perspective</b></p> <p>Speaker: Lori Miller, Department of Homeland Security / US Department of Agriculture</p>
0945 - 1005	<p>– <b>Topic: Colorado Department of Public Health and Environment (CDPHE)</b></p> <p>Speakers: Eric Jacobs (CDPHE)</p>
1005 – 1015	– Break
1015 -1035	<p>– <b>EPA Perspective and Food Safety and Modernization Act (FSMA) Section 208</b></p> <p>Speaker: Dr. Paul Lemieux, Environmental Protection Agency</p>
1035 – 1130	<p>– <b>Panel: What should be included in Ag Disposal Plans/Policy/Guidance?</b></p> <p><b>An interactive Q/A Session for Participants to Provide Feedback to Improve Governmental Policy on Agricultural Disposal</b></p>

	<p><b>MC:</b> Garry Briece</p> <p><b>Panelists:</b></p> <p>Lori Miller, Nick Streigel, Bill Benerman, Jim Williams, Eric Jacobs, Paul Lemieux</p>
1130-1150	<p>– <b>Economic Impact of FMD in Response and Recovery</b></p> <p>Speaker: Dr. Bruce McCarl, Texas A&amp;M University</p>
1150 -1250	– Lunch
1250 – 1310	<p>– <b>Geospatial Considerations in Carcass Disposal</b></p> <p>Speaker: Priscilla Fitzmaurice, USDA APHIS Veterinary Services</p>
1310 - 1350	<p>– <b>Topic: FMD Scenario and Demonstration of Disposal Tools</b></p> <p>Speaker: Lori Miller, Department of Homeland Security / US Department of Agriculture</p>
1350 – 1400	– Break
1400 – 1625	<p>– <b>Breakout Session: Practice Using Disposal Tools (Disposal Options Matrix, Disposal Decision Tree, Disposal Checklist)</b></p> <p>Facilitators: Brooke Pearson, Stacey Tyler, George Greenleaf, Katrina McKonkey, Mike Mayes, Paul Lemieux, Bob DeOtte</p>
1625 – 1655	<p>– <b>Outbrief and Next Steps: Action Planning for Future Local Agricultural Discussions</b></p> <p>Facilitator: Garry Briece, Local WARRP Program Integrator</p>
1655 – 1700	<p>– <b>Summary &amp; Closing Remarks</b></p> <p>Speakers: Lori Miller, Department of Homeland Security / US Department of Agriculture &amp; Dr. Keith Roehr, State Veterinarian of Colorado</p>

## Annex B –Participants

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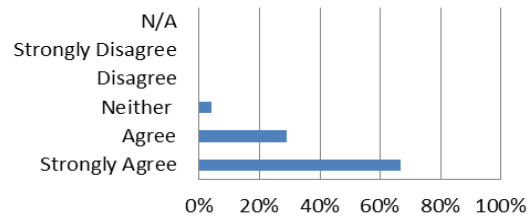
Name	Organization
Benerman, Bill	– Denver Environmental Health
Bratton, Dale	– Wyoming Livestock Board
Briese, Garry	– Cubic
Chau, Shun-Ping	– EPA
Clabaugh, Bruce	– Waste Management
DeOtte, Robert	– West Texas A&M University
DiPaolo, Elizabeth	– Cubic
DuTeaux, Shelley	– California Air Resources Board
Finehout, Jason	– Adams County OEM
Fitzmaurice, Priscilla	– USDA
Geiser-Novotny, Sunny	– USDA APHIS
Gelston, Tim	– FEMA
Greenleaf, George	– Cubic
Hakim, Abdul	– California Department of Public Health
Heckendorf, Carl	– Colorado Department of Agriculture, Division of Animal Industry
Hill, Emilie	– Cubic
Hodge, Talor	– Colorado Division of Emergency Management
Holmes, Robert	– California Department of Resources Recycling and Recovery
Hunt, III Elbert	– Colorado Department of Transportation
Jacobs, Eric	– CO Department of Public Health and Environment
Kennedy, John	– EPA
Kimble, Kerry	– Colorado Division of Emergency Management
Knowlton, Robert	– Sandia National Laboratories
Kramer, Thaine	– Colorado Department of Public Health and Environment
Lalum, Robert	– Calif Dept Food and Ag, Milk and Dairy Food Safety
Lemieux, Paul	– U.S. EPA/NHSRC/DCMD
Leos, Valmichael	– EPA
Lloyd, Lisa	– EPA
Logan, Jim	– State of Wyoming
Malmlov, Ashley	– Colorado State University
Maxey, Keith	– CSU Extension - Weld County
Mayes, Michael	– NC Department of Agriculture, Emergency Programs
McCarl, Bruce	– Texas A&M University
McConkey, Katrina	– Cubic Applications, Inc.
Meisinger, Jessica	– National Renderers Association
Menah, Pat	– Cubic
Meyer, Bob	– Wyoming Livestock Board

<b>Name</b>	<b>Organization</b>
Miller, Lori	– DHS
Minamyer, Scott	– USEPA
Nienhueser, Mikki	– Nebraska Department of Agriculture
O'Brien, Bethany	– USDA APHIS
Pabilonia, Kristy	– Colorado State University
Pearson, Brooke	– Cubic
Peck, Cara	– EPA
Peil, Kaleigh	– Wyoming Livestock Board
Perrin, Rebecca	– US EPA Region 8
Phillips, Gina	– Colorado Division of Emergency Management
Poulet, Chris	– CDC/Agency for Toxic Substances and Disease Registry
Ridley, Teri	– Cubic
Roehr, Keith	– Colorado Department of Agriculture
Rowden, John	– Calif Dept Food and Ag, Milk and Dairy Food Safety
Sater, Larry	– CDPHE, Laboratory Services Division
Schnackenberg, Debrah	– Pet Aid Colorado
Schuetz, Megan	– U.S. Environmental Protection Agency - Region 7
Shanahan, Mike	– US EPA Region 8
Simunich, Marilyn	– Idaho State Dept. of Agriculture
Spensieri, Sara	– Boulder County
Stewart, Robert	– Department of the Interior
Striegel, Nick	– Colorado Department of Agriculture
Swain, Troy	– Weld County Dept. Public Health & Environment
Tickel, Jimmy	– North Carolina Dept of Ag & Consumer Services EM Div
Tyler, Stacey	– Cubic
Van Metre, Dave	– Colorado State University
Wall, Steve	– EPA
Will, Paul	– CDPHE/HMWMD
Williams, Jim	– USDA, APHIS, Veterinary Services
Willison, Stuart	– EPA-NHSRC
Wingfield, Wayne	– National Medical Response Team

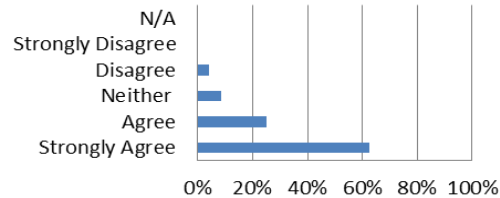


## Annex C – Participant Feedback

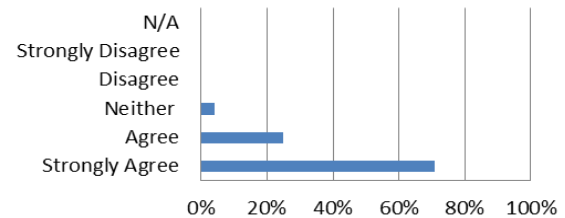
**Workshop Was Valuable Use of Time**



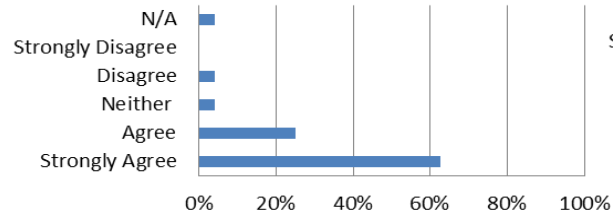
**Workshop Increased Awareness of CBR Incident**



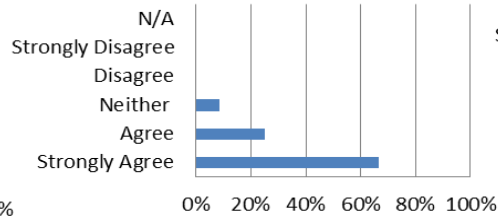
**Learned Something New From Workshop**



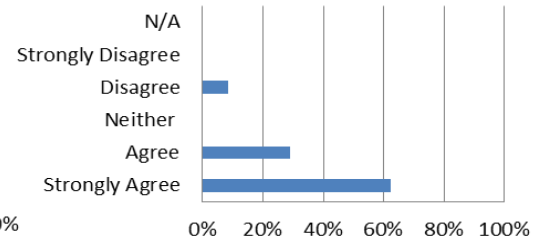
**Workshop Expanded Professional Network**



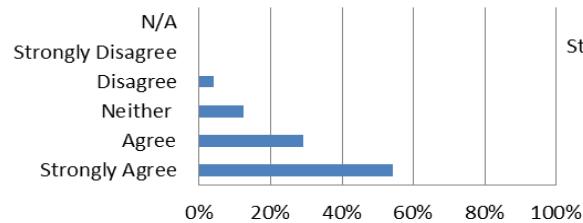
**Recommend WARRP Workshop to Colleagues**



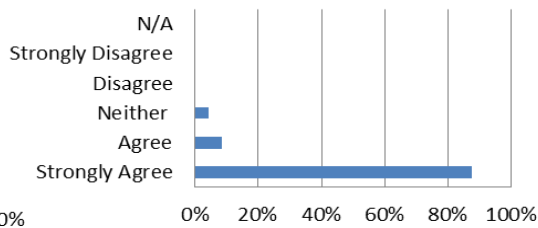
**Workshop Met Expectations**



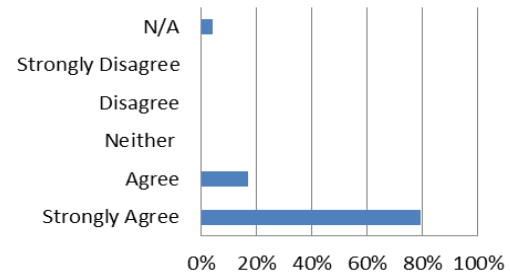
**Workshop Identified & Addressed Relevant Issues**



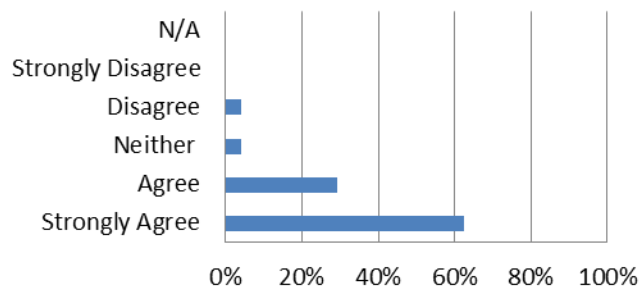
**Professional Staff**



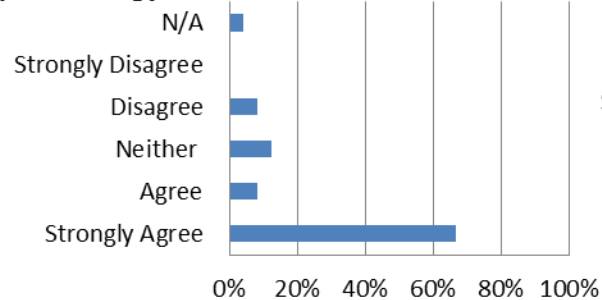
**Need for Future Agricultural Recovery Workshops**



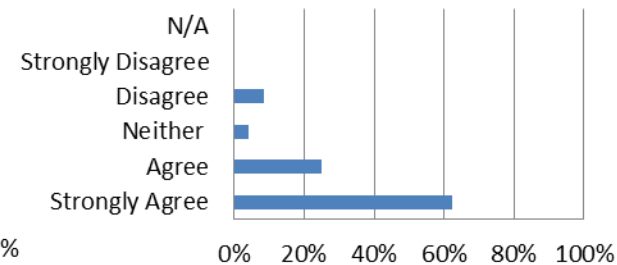
**Facilities Contributed to Success**



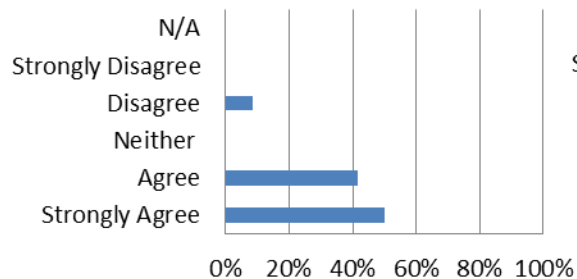
**Increased Knowledge of FMD Epidemiology**



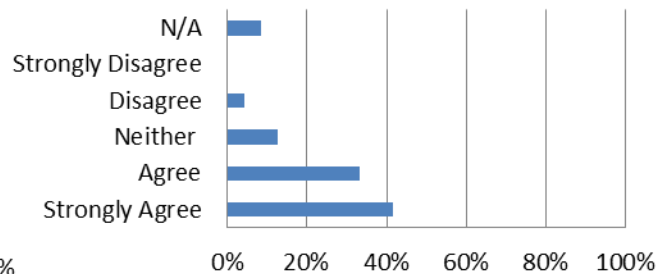
**Improved Understanding of Ag Waste Disposal Following FMD Outbreak**



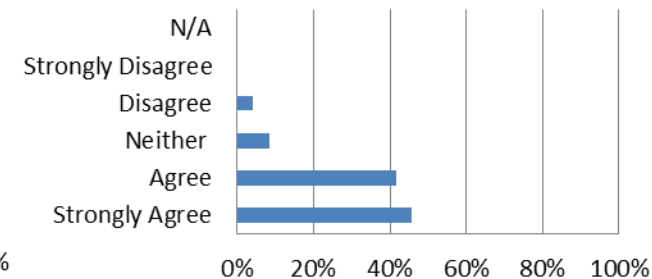
**Better Understanding of Carcass Disposal Technologies**



**Improved Ability to Respond & Recover From Outbreak**



**Workshop Format Valuable Training Tool**



## Annex D – Key Points of Contact

### Planning Team

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Mike Mayes	NCDA&CS	919- 306-3933	michael.mayes@ncagr.gov
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Paul Lemieux	EPA	919-541-0962	lemieux.paul@epamail.epa.gov
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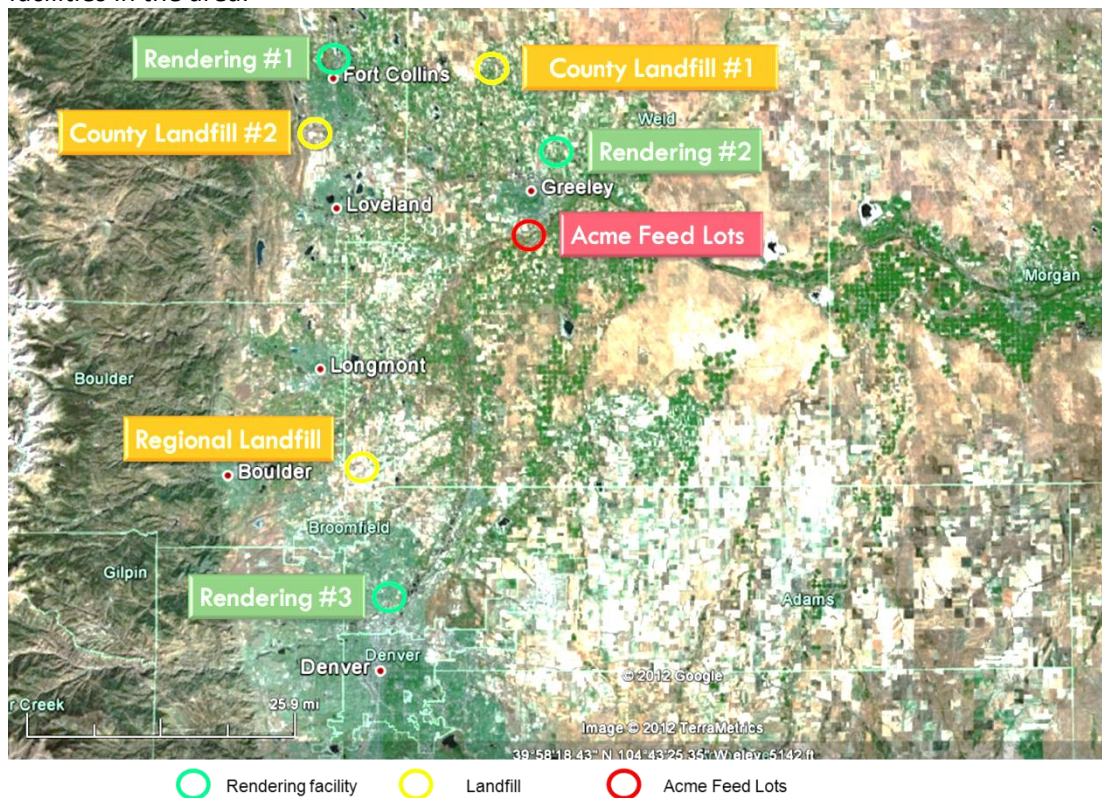
# Annex E – Read Ahead Material

## Background Information

According to a 2007 Census of Agriculture, Weld County agriculture leads the state in 16 of the 27 categories it lists in terms of receipts for agricultural products. It is ranked No. 1 in the number of sheep and lambs, No. 2 in cattle and calves, and No. 3 in the value of livestock, poultry and their products.

Weld's dairies lead the state in the production of milk. Weld produces 57 percent of the milk in Colorado and has become the 17th largest dairy county in the U.S. in cow numbers (almost 70,000). Of the 130 dairies in Colorado, 74 of them call Weld County home. That industry is expected to expand in the coming years with the addition of Leprino Food's second largest cheese plant in Greeley. That plant is on the same land that housed a sugar processing factory for more than 100 years and will help Colorado become the largest producer of mozzarella cheese in the world once in full operation.<sup>1</sup>

Weld County Co has over ~500,000 head of cattle in its 20 mile vicinity. There are 3 landfills and 3 rendering facilities in the area.



<sup>1</sup> Weld Co 150 year anniversary website. <http://www.weldcounty150.org/AgricultureinWeldCounty/index.html>

## Regulatory Framework

The following agencies may regulate aspects of on-site treatment/disposal activities:

- **US Environmental Protection Agency** - enforces the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act, any of which may apply to all on-site treatment/disposal methods discussed in this course.
- **Food and Drug Administration** - regulates products for human and animal consumption, such as rendering products.
- **Occupational Safety and Health Administration** - enforces standards to protect workers from hazards in the workplace.
- **US Department of Agriculture** - regulates select agents (such as highly pathogenic avian influenza [and FMD] ) and measures to control animal disease outbreaks, including carcass disposal methods for specific diseases.
- **State and Local Agencies** - enforce implementation of Federal laws by issuing site-specific permits, regulating carcass disposal activities, and regulating infectious materials.

## Situation

Acme Feed Lots located in Weld County, CO has just discovered that one of its cattle is infected with Foot and Mouth Disease (FMD). FMD is “highly contagious viral disease . . . characterized by fever and blister like lesions followed by erosions on the tongue and lips, in the mouth, on the teats, and between the hooves. Most affected animals recover, but the disease leaves them debilitated. It causes severe losses in the production of meat and milk”.<sup>2</sup>

Because of this outbreak, and the possibility for the virus spread quickly, the decision has been made that all cattle on the feedlot must be euthanized. This farm has 20,000 head of cattle. Your team has been assigned to report immediately to the Incident Command Post and have been assigned to the operations section response branch disposal group. See Figure 1 –

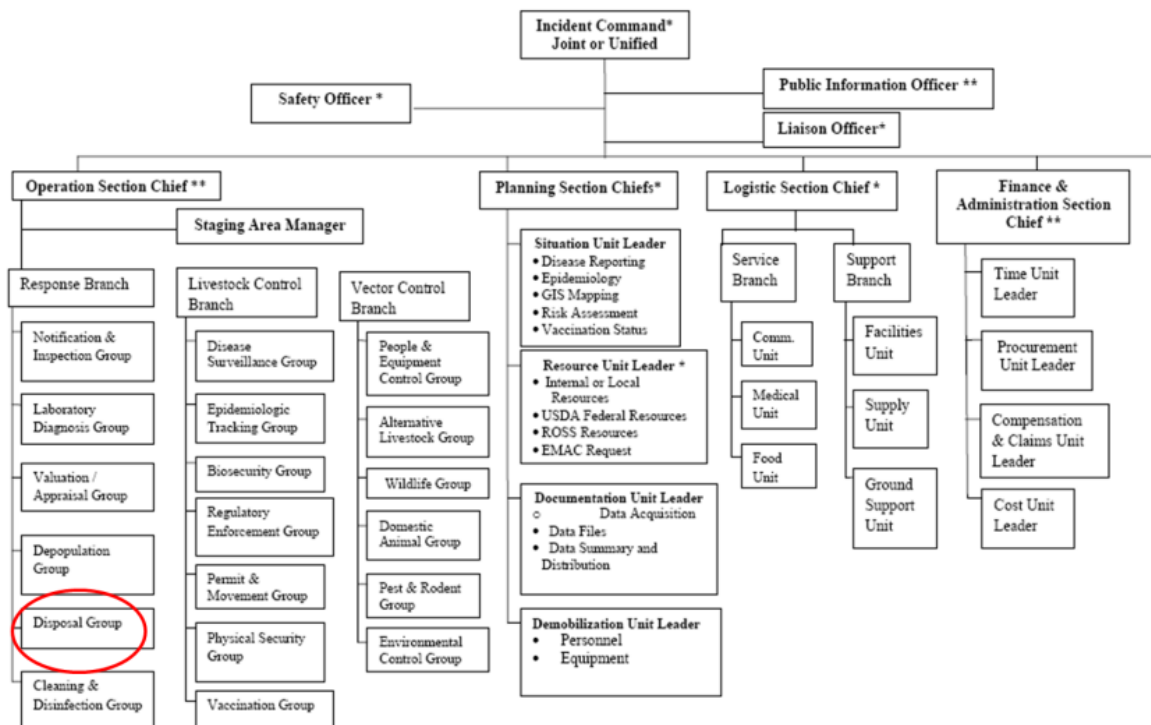


to

<sup>2</sup> USDA APHIS Veterinary Services “Foot and Mouth Disease Factsheet” February 2007.  
[http://www.aphis.usda.gov/publications/animal\\_health/content/printable\\_version/fs\\_foot\\_mouth\\_disease07.pdf](http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_foot_mouth_disease07.pdf)



## Incident Command Organization Chart

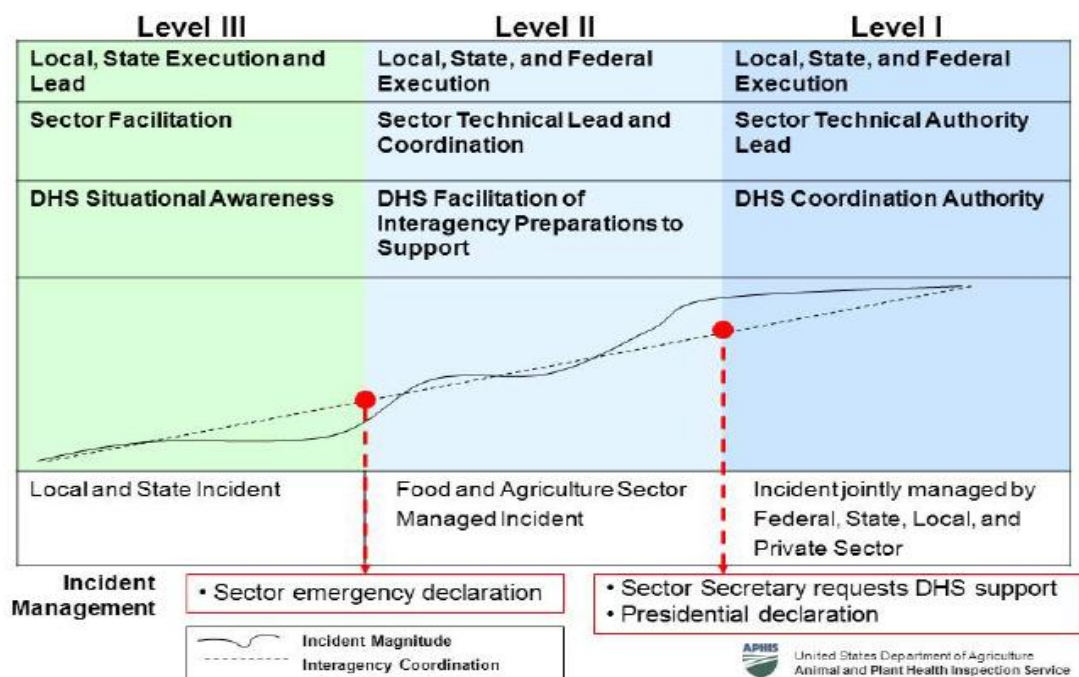


**Figure 1: Incident Command Organization Chart**

You will be working with other technical specialists from USDA, DHS, and CO Department of Agriculture to respond to this incident. Currently, this incident is considered a level III incident meaning that it is at the lowest level of those incidents that are of national significance. (See Figure 2 - Levels of Incident Management Effort)

A level III incident is a response to an event or incident, the scope or severity of which the lead program unit is evaluating or that requires a limited response. In either case, enough resources (Federal, State, or local personnel) are available in the area or State to staff the evaluation or initial response effort.<sup>3</sup>

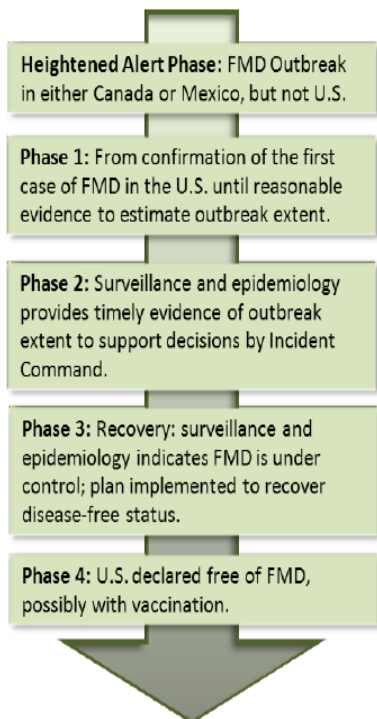
<sup>3</sup> "FMD Response Plan: The Red Book" FAD PreP Foreign Animal Disease Preparedness & Response Plan. National Center for Animal Health Emergency Management, United States Department of Agriculture, Animal and Plant Health Inspection Service. June 2012, accessed June 29, 2012, [http://www.aphis.usda.gov/animal\\_health/emergency\\_management/downloads/fmd\\_responseplan.pdf](http://www.aphis.usda.gov/animal_health/emergency_management/downloads/fmd_responseplan.pdf)



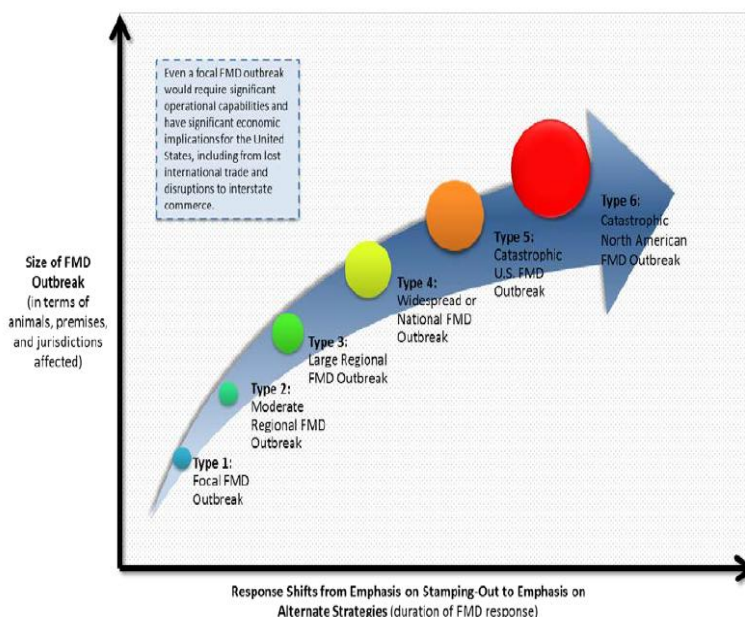
**Figure 2: Levels of Incident Management Effort**

According to the Foreign Animal Disease Preparedness & Response Plan, incidents have both a phase and type. See Figure 3 for a description of response phases.

A response **phase** is defined as: A temporal stage in FMD outbreak response. See figure 3.



**Figure 3: Response Phases**



**Figure 4: Response Types**

A response **type** is defined as: a categorical measure of magnitude of an FMD outbreak. See figure 4.

This incident is deemed to be in phase 1: defined as “confirmation of the first case of FMD in the U.S. until reasonable evidence to estimate the outbreak extent.”

The size of this incident is currently is a Type 1: Local FMD Outbreak.

Going back to our scenario, we have a feedlot holding 20,000 head of cattle, one of them having been confirmed to be infected with FMD. The feedlot has been quarantined and following review of local, state, and federal plans it has been decided that all cattle in the feedlot must be depopulated within 24h and disposed of within 48h. **Your job is to determine how to dispose of the carcass remains.**

Disposing of 20,000 head of cattle is no easy task. A major consideration is the fact that the virus is highly contagious and can quickly be spread to farms in the nearby area. Another feedlot is located only 2 miles from Acme and contains over 90,000 head of cattle. Typically, the infected zone should extend a minimum of 6.2 miles (10km) beyond the presumptive or confirmed infected premises. You and your team have to make ongoing decisions on if the cattle at the nearby feedlot need to be put down to create a buffer zone.



The weather today is hot, 90 degrees Fahrenheit. After the cows are put down, rapid decomposition will set in due to the hot weather. As a result, cows will start bloating and exploding as they fill with decomposition gases.

A *Disposal Options Matrix* has been developed to help you make the best decision about how to handle the disposal of the carcasses. See Figure 5 below. Right now, your main concern is to dispose of ~20,000 cattle as quickly as possible.

It is OK and recommended to consider using **more than one** of the choices to dispose of the remains.

	Composting	Rendering	Off-Site Landfill	Off-Site Incineration	Open Air Burning	On-Site Burial	Mobile Treatment Technologies
Public Health Risk	3	3	3	3	2	1	?
Need to Transport Carcasses Offsite	3	1	1	1	3	3	3
Byproducts	3	3	2	3	1	1	?
Biosecurity	2	3	2	2	1	1	?
Pathogen Inactivation	3	3	1	3	2	1	?
Cost Effectiveness	3	2	3	1	1	3	?
Environmentally Sustainable	3	3	2	2	1	1	?
Volume Reduction	2	3	2	3	3	2	?
Capacity	2	2	3	1	2	3	1
Throughput	2	3	3	1	2	2	1
Availability	2	2	3	1	3	1	1
Speed to Implement	2	2	3	2	1	1	?
Public Acceptance	3	2	3	2	1	1	?
Efficiency	2	3	2	2	1	2	?
Operability	2	2	2	2	2	3	1
Total Points	37	37	35	29	26	26	7
Average Score	2.5	2.5	2.3	1.9	1.7	1.7	1.4

**Matrix Explanation**

Green technologies were scored 3 points

Yellow technologies were scored 2 points

Red technologies were scored 1 point

Scores for each measure were added up and then assigned an average score

If information was not available, the score was not included in the average

**Color Key**

Ideal

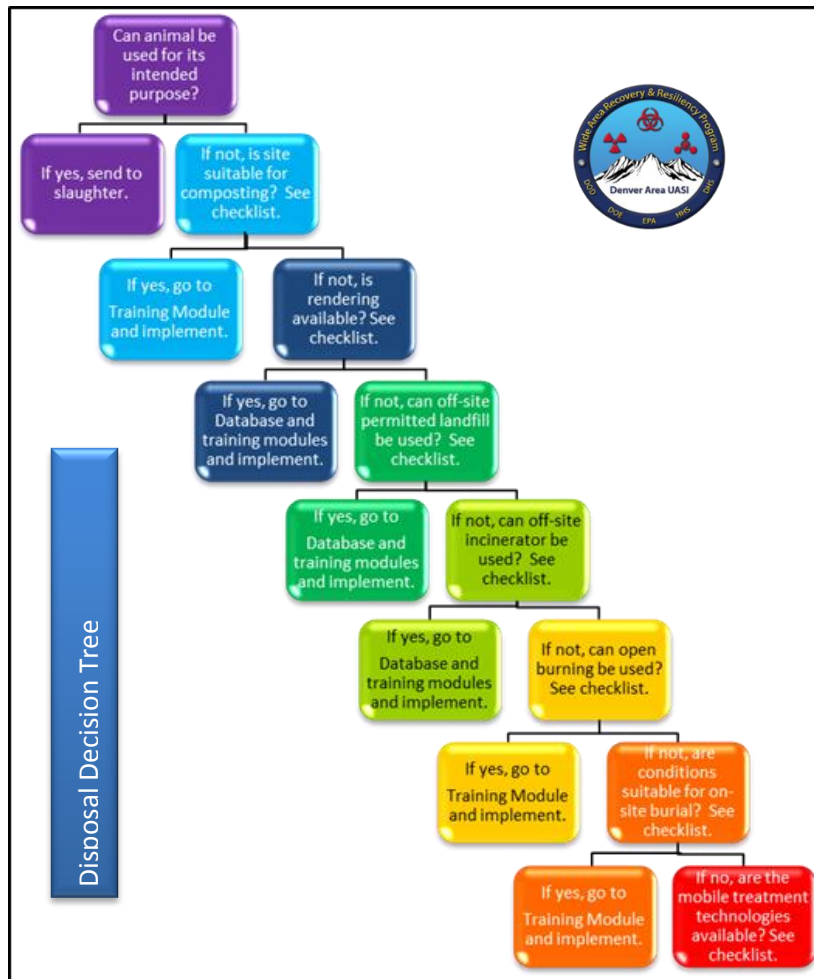
Not Ideal

Not Suitable

**Figure 5: Disposal Options Matrix**

This matrix was developed by experts at APHIS and a value has been assigned to each of the disposal options. This matrix was then utilized to develop the *Disposal Decision Tree* and *Disposal Checklist* we will be guiding you through. This checklist is designed to enable the Disposal Group Supervisor to select the suitable disposal options for a particular site as efficiently as possible.

After you review the matrix to get familiar with disposal choices, please review the *Disposal Decision Tree* flow chart in figure 6. This tool is used to visually represent the path you can take while considering your options.



**Figure 6: Disposal Decision Tree**

## Operating Assumptions

### Emergency Response Considerations

- Response to an animal disease outbreak will begin at the local level.



- If an animal disease emergency occurs in Colorado's Concentrated Animal Feeding Operations (CAFO) industry, the most probable means of discovery will be by feedlot operators, private practice veterinarians and / or trace information from an animal disease investigation in another state. Local livestock experts like brand inspectors and livestock extension agents may also be involved in initial local detection and background information about current prevalence of livestock diseases and conditions.

Private or consulting veterinary practitioners will likely be the first responders to any animal disease outbreak.

- A veterinarian is required to immediately notify the State Veterinarian or the USDA Area Veterinarian in Charge (AVIC) of any suspected foreign animal disease.
- An animal disease outbreak may occur through natural pathways or could be introduced as an act of terrorism.
- Diagnosis of a highly contagious or emerging animal disease in Colorado, the United States or surrounding countries may significantly restrict the intrastate, interstate and international movement of animals (especially livestock) and animal products.
- Initiation and implementation of response actions for a suspected or positive foreign animal disease (FAD) will be under the jurisdiction of the CDA and carried out by the State Veterinarian or official designee in conjunction with the AVIC of USDA, APHIS. Producer input and involvement will be highly valued and integrated into the response.
- The State Veterinarian and the USDA APHIS AVIC will work in close coordination in any animal health emergency. There are established protocols for investigating and reporting potential FADs and new and emerging infectious animal diseases.
- Response measures for an animal disease emergency may involve the mutual aid support from sister counties and municipalities as well as local private industry support.

#### **Economic Impacts**

- Animal disease emergencies may lead to prolonged economic impacts requiring long term federal and state assistance programs for recovery.

#### **Human / Psychological Considerations**

- Owners losing livestock in an animal disease emergency or persons responding to the situation may require psychological counseling and support.

#### **Carcass Transportation Considerations**

- Travel routes have minimal stops, limiting any human exposure
- All special permitting requirements for transporting hazardous waste have been waived
- All vehicles are equipped with an absorption and/or liquid collection system

#### **Livestock Considerations**

- The animals cannot be used for their intended use due to the FMD virus. They cannot be taken to slaughter or used in any form of human consumption/products.
- Animals must be euthanized within 24 hours and disposed of in 48 hours.

## *Annex F – Acronyms*

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After Action Report (AAR)  
Animal and Plant Health Inspection Service (APHIS)  
Bovine spongiform encephalopathy (BSE)  
Chemical, Biological, Radiological (CBR)  
Centers for Disease Control (CDC)  
Colorado Department of Agriculture (CDA)  
Colorado Division of Emergency Management (CDEM)  
Colorado Division of Public Health and the Environment (CDPHE)  
Colorado Highway Patrol (CHP)  
Colorado Rapid Response for Agriculture and Livestock (CORRAL)  
Colorado State University (CSU)  
Department of Homeland Security (DHS)  
Department of Interior (DOI)  
Environmental Protection Agency (EPA)  
Federal Emergency Management Agency (FEMA)  
Foreign Animal Disease Diagnostician (FADD)  
Food Safety and Inspection Service (FSIS)  
Foot and Mouth Disease (FMD)  
Geographical Information System (GIS)  
Health and Human Services (HHS)  
Hazardous Materials and Waste Management Division (HMWMD)  
Interagency Biological Restoration Demonstration (IBRD)  
Knowledge Enhancement Working Group (KEWG)  
Matrix, Tree, Checklist (MaTCh)  
Municipal Solid Waste (MSW)  
National Cattlemen's Beef Association (NCBA)  
Subject Matter Expert (SME)  
Urban Area Security Initiative (UASI)  
Unified Command (UC)  
United Kingdom (UK)  
United States Department of Agriculture (USDA)  
Wide Area Recovery and Resiliency Program (WARRP)